ImageQuest

Q790

Multiscanning Color Monitor

TECHNICAL SERVICE MANUAL

HYUNDAI

ImageQuest Q790 TECHNICAL SERVICE MANUAL

http://hyundaiQ.com

Safety Precaution

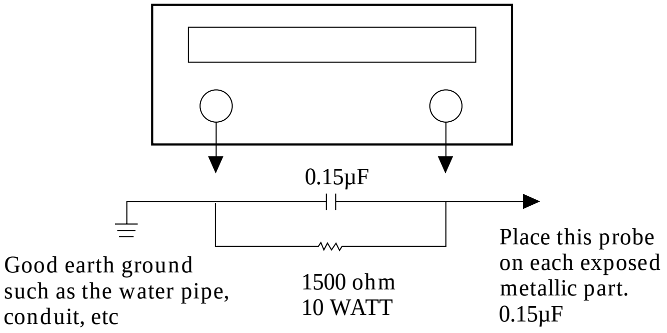
WARNING

Service should not be attempted by anyone unfamiliar with the necessary precautions on this monitor.

The followings are the necessary precautions to be observed before servicing.

1. Always discharge the high voltage to the CRT conductive coating before handling the CRT. The picture tube is highly evacuated and if broken, glass fragments will be violently exploded. Use shatter proof goggles and keep picture tube away from the bare body while handling.
2. When replacing a chassis in the cabinet, always be certain that all the protective devices are put back in place, such as nonmetallic control knobs, insulating covers, shields, isolation resistor capacitor network etc.
3. Before returning the monitor to the customer, always perform an AC leakage current check on the exposed metallic parts of the cabinet, such as signal connectors, terminals, screw heads, metal overlays, control shafts etc, to be sure the monitor is safe to operate without danger of electrical shock. Plug the AC line cord directly into a AC outlet (do not use a line isolation trasformer during this check.). Use an AC voltmeter having 1500 ohm per volt or more sensitivity in the following manner : Connect ground(water pipe, conduit, etc.) and the exposed metallic parts, one at a time. Measure the AC Voltage across the combination of 1500 ohm resistor and 0.15µF capacitor. Reverse the AC plug at the AC outlet and repeat AC voltage measurements for each exposed metallic part. The Voltage must not exceed 0.3 volts RMS. This corresponds to 0.2 milliamp AC. Any value exceeded this limit constitutes a potential shock hazard and must be corrected immediately.

AC VOLTMETER


0.15µF
Good earth ground such as the water pipe, conduit, etc
1500 ohm 10 WATT
Place this probe on each exposed metallic part.
0.15µF

INSTRUCTIONS TO USER

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instruction, may cause interference to radio and television. It has been tested and found to comply with the limits for the specifications in Subpart J of Part 15 FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures.

- reorient the receiving antenna
- relocate the computer with respect to the receiver
- plug the computer into a different outlet so that computer and receiver are on different branch circuits.

X-Ray Radiation Precaution

1. Excessive high voltage can produce potentially hazardous X-RAY RADIATION. To avoid such hazards, the high voltage must be under the specified limit. The nominal value of the high voltage of this monitor is 25KV±1.0KV at zero beam current(minimun brightness) under a 120V AC power source. The high voltage must not(under any circumstances) exceed30KV. Each time a monitor requires servicing, the high voltage should be checked. It is recommended the high voltage be recorded as a part of the service record. It is important to use an accurate and reliable high voltage meter.
2. This monitor is equipped with a protection circuit which prevents the monitor from producing excessively high voltage. Each time the monitor is serviced, the protection ircuit must be checked to determine that the circuit is properly functioning.
3. The only source of X-RAY RADIATION in this monitor is the picture-tube.
   For continued X-RAY RADIATION protection, the replacement tube must be exactly the same type tube as specified in the parts list.
4. Some parts in this monitor have special safety-related characteristics for X-RAY RADIATION protection.
   For continued safety, parts replacement should be undertaken only after referring to the product safety notice.

RODUCT SAFETY NOTICE

Many electrical and mechanical parts in this monitor have special safety-related characteristics.
These characteristics are often not evident from visual inspection.
Replacement parts which have these special safety characteristics are identified in this manual; electrical components having such features identified by "⚠" in the replacement parts list and schematic diagram.
For continued protection, replacement parts must be identical to those used in the original circuit.
The use of substitute replacement parts which dose not have the same safety characteristics as the factory recommended replacement parts shown in this service manual, may create shock, fire,
X-RAY RADIATION or other hazards.

PRODUCT CDRH NOTICE

Electrical potentiometers which is marked as caution "⚠" in parts list are critical components
of safety & CDRH.
Therefore, for continued protection, replacements parts must be used it which is used in original PCB ASS'Y.

General Inforormation

1. Description

This 17" (16" viewable) color display monitor is operated in R, G, B, drive mode input.

2. Operating instructions

2-1. Front

Power Switch, Menu, Select,Down(▼),Up(▲) Power LED

2-2. Rear

Input connection [AC & SIGNAL CABLE]

2-3 Service Instruction(internal controls)

High-Voltage, Focus

2-4. OSD Controls

Brightness/Contrast, H/V-Position, H/V-Size, Pincushion,Trapezoid, Parallelogram, Pin Balance, Corner, Top/BTM, H/V Moire, Degauss, Color Control, Recall, OSD H/V Position, H/V Linearty, Language, Information, Rotation.

3. Electrical Characteristics

3-1. 100-240 Volt 60Hz/50Hz for use all over the world.

This power supply is a 100 Watt multi output SMPS for monitor

3-2. Video

Input : 0.7 Vp-p analog signal(at 75 ohm terminated)
Bandwidth : 202MHz(Max.Dot Rate)
Polarity : Positive

3-3. Horizontal Drive

Level : TTL High : 2.4V min
Low : 0.4V max
Polarity : Negative or Positive
Frequency : 30kHz - 97kHz
Timing Limits : Pulse width ($0.5\mu s \leq Thp \leq 5.5\mu s$)

3-4. Vertical Drive

Level : TTL High : 2.4V min
Low : 0.4V max
Polarity : Negative or Positive
Frequency : 50Hz - 150Hz
Timing Limits : Pulse width ($0.02\mu s \leq Tvp \leq 0.2ms$)

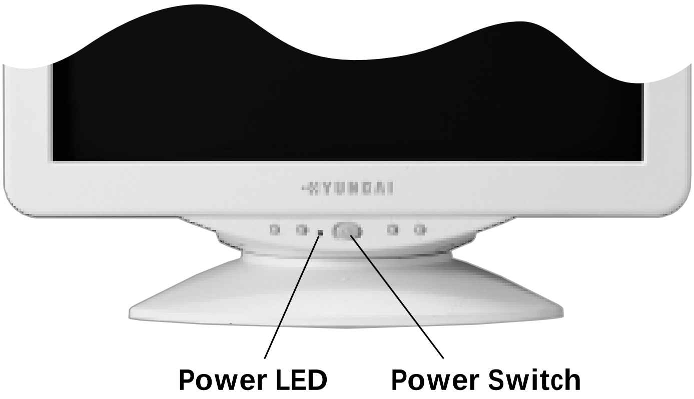
4. Model Description

TCO’95/99

CRT Type : - SAMSUNG SDI : M41QCJ761X172
- ORION : M41QEC 280XX021

Control Desciption

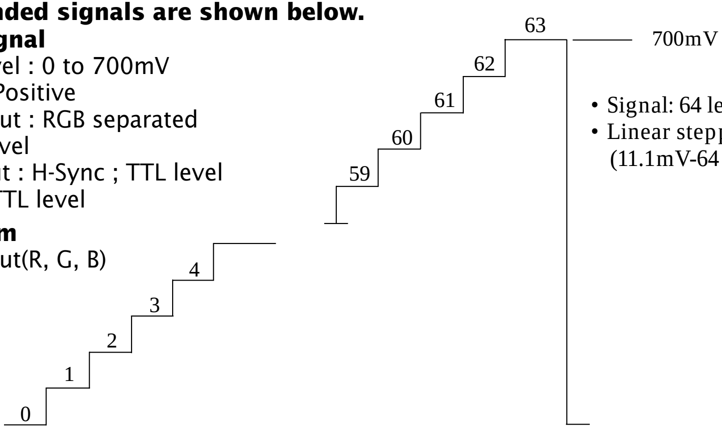
Front View


HYUNDAI
Power LED
Power Switch

Video Input Signal

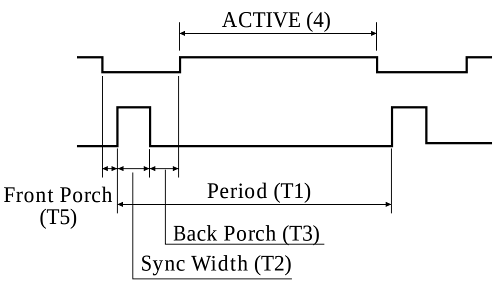
Recommended signals are shown below.

- **Video Signal**
  Video Level : 0 to 700mV
  Polarty : Positive
  Video Input : RGB separated
  Analog level
  Sync input : H-Sync ; TTL level
  V-Sync ; TTL level
- **Waveform**
  Video input(R, G, B)

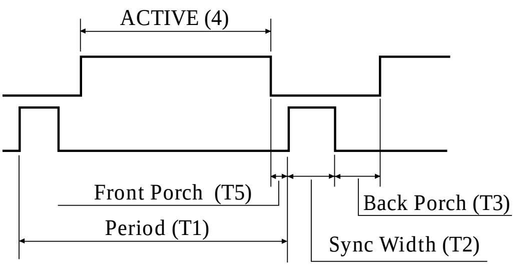

63
700mV
62
61
60
59
4
3
2
1
0

- Signal: 64 level gray scale
- Linear stepping:
  (11.1mV-64 Steps)

- **H-Sync**


ACTIVE (4)
Front Porch
(T5)
Period (T1)
Back Porch (T3)
Sync Width (T2)

- **V-Sync**


ACTIVE (4)
Front Porch (T5)
Back Porch (T3)
Period (T1)
Sync Width (T2)

▪ Timing Table

No	Resolution	Horizontal Frequency	Refres rate
1	720 x 400	31.5 KHz	70 Hz
2	640 x 480	50.6 KHz	100 Hz
3	800 x 600	53.7 KHz	85 Hz
4	1024 x 768	60.0 KHz	75 Hz
5	1024 x 768	68.7 KHz	85 Hz
6	1152 x 864	67.5 KHz	75 Hz
7	1280 x 1024	80.0 KHz	75 Hz
8	1280 x 1024	91.1 KHz	85 Hz
9	1600 x 1200	93.8 KHz	75 Hz

Note: Even if the monitor detects the input timing as a factory preset mode, the size and position may not be able to be set as desired. Check the input timings are under the specifications and adjust the image as you want.

For better quality of display image, use the timing and polarity shown in the table above. Please see your video card user's guide to ensure compatibility.

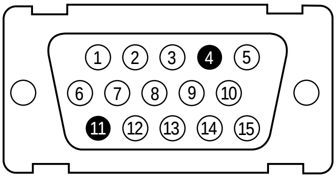
Video Input Terminal

A 15 Pin D-sub male connector is used as the input signal connector.
Pin and input signals are shown in the table below.

Pin Description

SIGNAL / PIN NO.	SEPERATE SYNC
1	RED
2	GREEN
3	BLUE
4	N.C
5	DDC RETURN
6	RED GROUND
7	GREEN GROUND
8	BLUE GROUND
9	+5V (Not used)
10	LOGIC GROUND
11	N.C
12	SDA
13	H-SYNC
14	V-SYNC(VCLK)
15	SCL

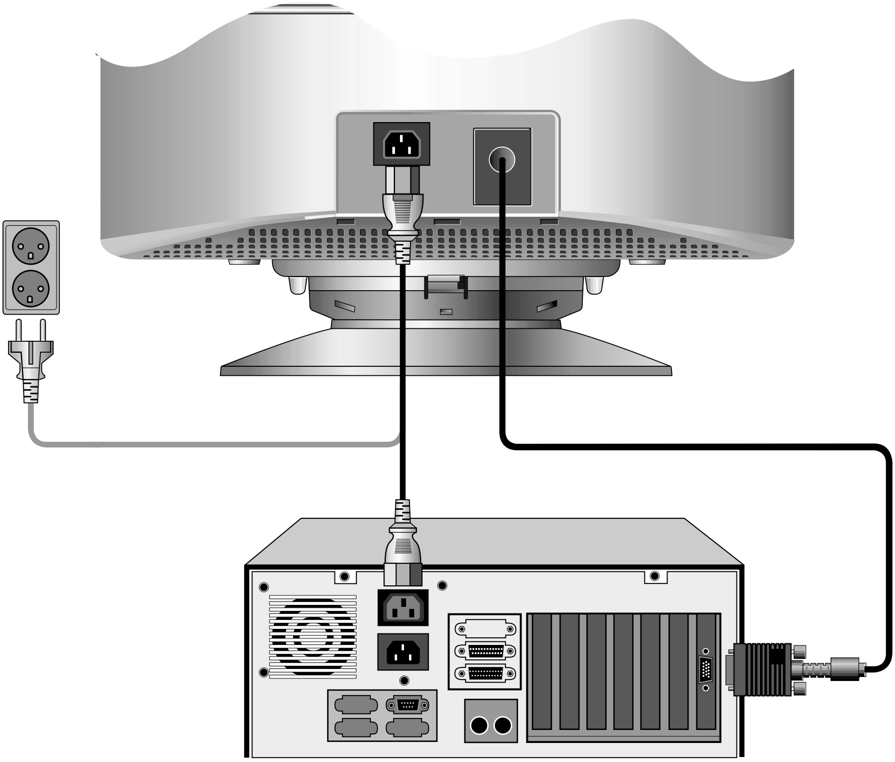
D-Sub male connector



Connecting With External Equipment

Cautions

Be sure to turn off the power of your computer before connecting the monitor.



Theory of Operation

1. Power Supply

The AC line voltage is from 100V - 240V AC.
The conducted noise is filtered(LP01), X and Y Capactor(CP01, CP02, CP03, CP04, CP11)
NTC01 reduces the inrush AC to DC, And this DC Voltage is charged CP05.
The ICF01(MC33260)IC is a PFC Circuit QF01 Drive Signal is generated from ICF01 Pin7.
The STR-F6654 is a hybrid IC(ICP01)with a built in control IC and Mosfet.
The srart-up circuit starts and stops the operation of the control IC by detecting the voltage appearing at the VIN(PIN4).
At start-up of the power supply, CP12 is charged though the start-up registor RP02.
When the VIN(PIN4), Voltage reaches 16V, the control circuit start-up operation by the function of the start-up circuit
(In normal state, VIN of ICP01 is supplied by CP12 dc voltage. In Power Saving Mode, Vin of ICP01 is supplied by CP10 dc voltage).
The switching frequency is locked to horizontal scan frequency by horizontal flyback pulse from sync transfomer(LP03).
The output pulse width is controled by current if OCP/F.B(PIN1).
The SMPS output has +185V, +80V,+15V, +7, -11V

2. Power Saving

The power supply supports the Its operation is shown in the table below.

MODE	H-SYNC	V-SYNC	MCU PIN 10	QP07
Stage1	O	O	H	ON
Stage2	X	O	L	OFF
	O	X		
	X	X		

3. Signal Processing and MCU Control

When the H and V sync are input to MCU, MCU can measures the H and V frequency to detect the video mode.MCU has digital to analog converter(DACs) control function like Brightness, Rotation, H/V-Lin, Degaussing and MCU can control, H/V Size, H/V Position Pincushion, Trapezoide, Parallel, Corner TOP/BTM, Pin Balance, H/V Moire, OSD H/V-Position, R/G/B Cut off, R/G/B drive I^2C BUS Line.

The operation of MCU is shown in the table below.

H-FREQ (kHz)	CS 1 PIN 30	CS 2 PIN 29	CS 3 PIN 28	CS 4
H < 36	L	L	L	L
36 < H < 40	L	H	H	L
40 < H < 44	H	L	L	L
44 < H < 51	H	L	L	H
51 < H < 55	H	L	H	L
55 < H < 62	H	L	H	H
62 < H < 66	H	H	L	L
66 < H < 72	H	H	L	H
72 < H < 85	H	H	H	L
85 < H < 95	H	H	H	H

4. Horizontal Deflection

TDA4841is an I^2C auto sync deflection controller for H/V sync and drive processing.
All functions are controlled by I^2C bus.
When H-Sync is applied, the internal oscillator is automatically locked.
The duty-cycle of H-output pulse(ICH01 Pin 8) is 45% (at 31.5KHz)
Horizontal B+ Drive Signal is generated from ICH01 pin6.
QH08 and TH01 are used to drive the H-output transistor (QH09). QH09 is turned on, it conducts current through the deflection yoke on the right hand side of the screen.
This current comes from the S correction capacitors (CH27, CH29, CH32, CH34), which have a charge equal to the effective supply voltage.
When the QH09 is opened up, the damper diode(DH11) allows current for left hand side of the screen to flow back through the deflection yoke to the S capacitors.
The flyback capacitor (CH23) determines the size and length of the flyback pulse.
The S capacitors correct outside versus center linearity in horizontal scan.
QH11, QH12, QH13, QH22 select the value of S capacitors.
B+ Drive singal is amplifier by push pull(QH24, QH25) amplifiered, this ampifiered signal the switching.
B+ Voltage is suppied horizontal deflection coil though coil(TH03).

5. Hign Voltage and Focus

High Voltage Control circuit is working basically by using switching therory with the main component ICH03(KA3843).

When power ON and the VCC DC level of pin 7 of ICH03 exceeding 8.4V, ICH03 starts to work and the oscillate frequency is decided by RH24,CH11.

ICH03 is working normally the output square wave of pin6 will turn on QH04. The ON/OFF cycle of QH04 will make the primary of FBT acted like a swiching power transformer AFC signal is differntial by CH10, RH04 and connected with CH11 in order to force ICH03 in synchronization. This high voltage will be always synchronized with horizontal deflection.

Usually loading change will cause unstable condition, so a high voltage feed back system is designed to maintain the stability of the high voltage circuit.

This feed back system is started from voltage sensor on the pin12 of the FBT. This sensor voltage compares with voltage of the OP1 via the butter(OP2) of ICH02(LM358) and returns to ICH03. A feed back reference high voltage circuit that consists of RH50, VRH01 and RH52 to adjust the high voltage.

During the period the horizontal frequency is changed, for example, H-Unlock will be from low to high(the time frequency changes).

H-Unlock is controlled by pin 17 of ICH01(TDA4841). After differential circuit that consists of RH43 and RH44, the signal will turn QH03 on When frequency changed and reduce the high voltage by paralleling with RH50, VRH01, RH52.

Dynamic focus is user to get perfect focusing of each dot on the screen.

- H-Focus : CS FET(QH11,QH12,QH13,QH22) output a parabolic waveform
  This waveform input into TH05
- V-Focus : ICH01 pin32 output a parabolic waveform
  This Waveform is amplified by QH05 and input into TH05
- H-Focus and V-Focus are into TH05 to get a combined output Waveform that will input to FBT pin 13.

6. Vertical Deflection

vertical defiection saw-tooth waveform is provided by ICH01 pin12,13(VOUT1,2) and amplified by ICV01(KA2142)

7. X-Ray Protection

X-Ray High Voltage Protection circuit to get a DC level Voltage by utilizing the output waveform of FBT pin 4 to pin7(GND) via a rectifier consists of DH07,CH36 This DC level voltage inputs to the pin2(X-Ray) of ICH01 TDA4841.

The preset X-Ray protection voltage is 5.2V if the high voltage is higher than the preset voltage, the DC level voltage input into the pin2 will also be higher than 6.4V It also means the HDRV signal is off, then horizontal deflection is off and the high voltage is alse off.

8. Video Amplifier and OSD Interface

LM1267(ICC04) is wide band video amplifier with three matched video amplifiers, contrast control, OSD contrast control, drive controls, blanking gate and clamp gate ICC04 is controlled by I^{2}C bus. H blank signal is applied to pin 24.

During blanking all three outputs are thrown to the pedestal level.

MCU(ICM01)Pin 32 Clamp is used to a clamp signal. The signal is applied to pin 23 are TTL compatible and typical bandwidth is 80MHZ.

A fast commutate pin is provided to select either the video or the OSD inputs as a source for the amplification.

OSD contrast controlled by I^{2}C bus.

MTV021(ICC01) is a high performance HCMOS device designed to interface with a micro controller unit (ICM01) to allow colored symbols or characters to be displayed on the monitor screen.

The output stage is made of 3-channel power amplifier(ICC02, LM2465T)

The output capable of 40 volt swing in less than 7 n sec.

The three cathodes are AC coupled to the video amplifiers.

The DC level on each cathode is set by a cut-off amplifier and clamp diode.

Trouble Shooting

1. Introduction

This trouble shooting guide is arranged by fault conditions. Following each fault condition is a check for a signal on condition to be answered YES or NO.
For NO answer proceed to the right and continue until the fault is located.
For a YES answer continue in the left column to the next numbered check.
Again followed this procedure until the fault is located.

2. Trouble shooting procedure

When Troubleshooting this monitor, some precaution should be observed.
Use a high quality isolation tranformer is capable of providing 3 Amps or more.
Never connect primary ground and secondary ground together including use with an isolation transformer.
Measure high voltage with respect to chassing ground only, and with a high impedance prove of 1000 mega-ohm or higher and rated for 30KV DC or higher Measure QH09 collector pulse with a high quality 100:1 probe rated for 1500 volts or higher.

3. Troubleshooting procedure

Symptom	Check(YES)	Action(NO)
a) Image is scrolling	1) Check for Vsync at pin 32 of ICM01	Check 15 pin D-sub connector ZDM02.
	2) Check for positive going Vsync at pin 14 of ICH01.	Check ICM01, ICH01
	3) Will V-oscillator is locked with input signal (pin 24 of ICH01)	Check CH02
	4) Check V-ramp at pin 13,14 of ICH01.	Replace ICH01.
b) Image is unstable	1) Check for H-sync at pin 33 of ICM01	Check 15 pin connector ZDM01 QM04
	2) Check for positive going V-sync at pin 15 of ICH01.	Check ICM01 , ICH01
	3) Will H-oscillator is locked with input signal pin 29 of ICH01	Check CH03, RH06,CH04,RH07,RH08 CH05,CH06
	4) Check H-out at pin 8 of ICH01	Replace ICH01
	5) Check for flyback pulse at pin 1 of ICH01.	Check RH10, TH05

Symptom	Check(YES)	Action(NO)
c) Screen is black but high voltage is present	1) Check for G2, pin4 of CRT. Around 500 volt	Check RC36, SGC05, CC18 socket
	2) Check for heater voltage at pin 6 of CRT. (about 6.3V)	Check CNC01, CC43, DP13
	3) Can screen be lit with brightness control at MAX	Check RC37, CC17, QH26, QH27, RH93 CRT socket.
	4) Check for video at pin 5, 6, 7 of ICC04	Check connector CNC02, DC01, DC02 DC03, DC04, DC05, RC01, RC02, RC03
	5) Check for positive pulse for clamp at pin 23 of ICC04	Check ICM01, RC132 CNC01
	6) Check for video at Pin 18,19,20 of ICC04.	Check ICM01, ICC04, 5VDC (Pin9)of ICC04
	7) Check for video at pin 6,7,9 of ICC02.	Check ICC02, LC01, LC02, LC03
	8) Check for video at Pin 1,2,3 of ICC02	Check ICC02, 80V(dc pin4) 12V(dc pin8)
	9) Check if R, G, B cut-off control the video DC level at pin 4, 6, 9 of CRT.	Check ICC03
	10) Check CRT.	
d) Screen is black with no high voltage.	1)Check for 80V at anode of DP12.	Check 80V with no load if no 80V. Check SMPS If 80V OK,Check TH04,QH04,.DH05,RH33
	2) Check for 12V at Pin7 of ICH03.	Check 12V with no load If no 12v Check ICP05,DP15,QP07,SMPS If 12V OK. Check ICH01,ICH03,ICC04
	3) Check Switching pulse of pin6 of ICH03	Check ICH03, RH24, CH11
	4) Check Switching pulse at Drain of QH04	Check QH04
	5) Check TH04(FBT)	
e) Focus Bad	1) Check for focus waveform at pin32 ICH01	Check ICH01
	2) Check for 300V at CH79	Check DH15, TH04
	3) Check Collector pules of QH05	Check QH05, CH73, CH74, TH05
	4) Adjust Focus VR of FBT	
f) No power	1) Check for AC input voit of AI01	Check Power cord AI01
	2) Check ICP01 pin 3,4	Check ICP01,NTC01,DP01
	3) Check switch pulse at Drain of QF01	Check ICP01,TP01,ICF01,ICP03,DP11
	4) Check voltage for, 180V at anode of DP11 and 5V at Pin3 of ICH01	Recheck above Item(d)

Adjustment Method

1. Caution

Extremely high voltage are present in the area around the FBT(TH04) and the anode high voltage Lead.

2. Equipment Required

Digital Voltmeter
Frequency Counter : about 40 Hz to 100 KHz
Color Analyzer
Video Signal Generator
High Voltmeter : up to 30 KV

3. Before Adjustment

Verify that the video output level is 0.7 Vpp at 75 ohm termination and the video timmings are same as standard timming given in specification. Place the AC power switch to the ON position.
Allow the monitor to stabillize thermally for 15 minutes at least before any adjustment about the image parameters. The electron optics of the CRT and electronics of system require time of stabillize.

4. Adjustment Procedure

4-1 Horizontal raster center setting

- Video Signal : Black pattern in 94KHz, 1600x1200@75Hz mode
- Measuring Point : G2 or JP31 on Main board
- Adjustment : VRH01 on main board
- Limits : 501 +/- 3V.

4-2 Factory mode setting

- Turn off the power.
- Keep pressing the menu select key until the power turns on.
- Press the menu select key one more time.
- You can see the “F” message in the bottom on the right of the OSD main menu.
- This is the factory mode.
- Turn off the power to save the adjusted state.
- Select the "Mode Information" menu after you exit the factory mode.

4-3 Rotation setting

- Video Signal : Cross Hatch pattern in 94kHz, 1600 mode
- Adjust the rotation of screen by using the menu select key and UP And Down Key.

4-4 Color setting

- Adhere color Analyzer sensor closely to CRT center.
- Video mode : 94kHz, 1600 mode

1 Color Temperature 9300˚K setting
- Video Signal : Back Raster pattern
- Select " RGB" by using the menu select key and up/down KEY.

① Cut-off Setting
- Select "CUT OFF" by using theup/down KEY
- Press the select key to get the desired R,G or B Cut-off.
- Press the up/down key to limit the X and Y color coordinate.
- Limits : x=0.283 ±0.5 ,y=0.297 ±0.02,Y=2.0 ±0.5cd/m^2

② Drive Setting
- Video signal : 2" square white box
- Select the "9300" by using the menu select key and R,G or B up/down KEY.
- Press the menu select key to get the desired R or B
- Adjust the brightness go to 80~100cd/m^2 by pressing the rotating the Using up and down key
- Press the up/down key to limit the X and Y color coordinate.
- Limits : x=0.283 ±0.02, y=0.297 ±0.02③④

③ Contrast Setting
- Adjust the brightness of 2" square white box by prsssing the rotating the using the up/down KEY in contrast
- More than 150 cd/m^2
- Limits : 150 ±3 cd/m^2

2) Color Temperature 6500˚K Setting
- Video Signal : Back Raster pattern
- Select " COLOR CONTROL" by using the menu select key and up/down KEY.

① Drive, contrast Setting
- The method of adjustment is same to 9300˚K
- The color coordinate is x=0.313 ±0.02, y=0.329 ±0.02

3) ABL Setting
- Video Signal : Back Raster pattern
- Select " AB" by using the menu select key and up/down KEY.
- Adjust the brightness to 105~110cd/m^2 by pressing the Using up and down keys of ABL

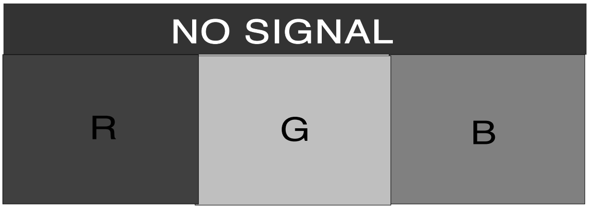
4-5 Focus
- Video Signal : Reverse " Full H " character pattern in 94kHz
- Adjust H/V Focus VR on the top and middle of the FBT so that the image of whole screen looks clear

4-6. X-Ray Protection Test
- In any signal input condition, short RH11 (main board) by using the JIG.
- At this moment, check out whether raster disappears.
- Remove the JIG.
- After the power switch of the set off and on, check out proper working

4-7. AGING and Self Test Mode

The monitor has an enhanced level of self-diagonostics.
When the signal cable is removed The monitor is operated to self test mode(Following OSD Image) and The Signal Isn't detected, the monitor is operated to OFF-Mode.

Picture A (MODE FOR END USER)



(OSD MESSAGE is moving around the screen)

Specification

CRT	SIZE	17"(16" viewable) Diagonal
	Dot Pitch	0.20 mm (Horizantal Dot Pitch)
	Type	Non-glare, Anti-Static & TCO Coated
Input	Signal	R.G.B Analog
	Cable	15 pin D-Type male Connector
SYNC	H-F	30 kHz～97 kHz(Automatic)
	V-F	50 Hz～150 Hz(Automatic)
Video Bandwidth		202.5 MHz (Max dot rate)
Display	Area(H×V) Color	305 ×229mm (Max. Over Scan) Infinite
Resolution	Max.	1600×1200(94kHz/75Hz)
User Controls & OSD Controls		Recall, Brightness/Contrast, H/V-Position, H/V-Size, Pincushion/Trapezoid, Rotation, H/V-Moire, Degauss, Color Control, Parallel, Information, Language, OSD H/V Poistion, Pin Balpance, Top/Botton-Corner, H/V-Linearity power switch
Power Management		As per VESA Standard, Lower than EPA's recommendation
VESA DDC 1/2B		Basic
Compatibility		VESA, 8514/A, XGA, EVGA, MAC II
Power Source		100-240 VAC(Universal Power) 80W 1.2A
Safety & Regulation	TCO	Basic
	EMC	FCC Class B,
	Safety	cULus, TÜV-GS, SEMKO, DHHS
Temperature	Storage	-20 to 60 degree celsius
	Operating	0 to 35 degree celsius
Humidity	Operating	35% to 80% (Non-condensing)
	Storage	5% to 85%
Weight		Unit : 16.0Kg ▪ Gross Weight :19.0Kg(with carton)
Dimension(W×H×D mm)		404×408×414mm

▶Specification is subject to change without notice for performance improvement.

Critical Parts Specification

TDA4841

FEATURES

Concept features

- Full horizontal plus vertical autosync capability
- Extended horizontal frequency range from 15 to 130kHz
- Comprehensive set of I^2C-bus driven geometry adjustments and functions, including standby mode
- Very good vertical linearity
- Moire cancellation
- Start-up and switch-off sequence for safe operation of all power components
- X-ray protection
- Power dip recognition
- Flexible switched mode B+ supply function block for feedback and feed forward converter
- Internally stabilized voltage reference
- Drive signal for focus amplifiers with combined horizontal and vertical parabola waveforms
- DC controllable inputs for Extremely High Tension (EHT) compensation
- SDIP 32 package.

Synchronization

- Can handle all sync signals (horizontal, vertical, composite and sync-on-video)
- Output for video clamping (leading/trailing edge selectable by I^2C-bus), vertical blanking and protection blanking
- Output for fast unlock status of horizontal synchronization and blanking on grid1 of picture tube.

Horizontal section

- I^2C-bus controllable wide range linear picture position, pin unbalance and parallelogram correction via horizontal phase
- Frequency locked loop for smooth catching of horizontal frequency
- Simple frequency preset of f_{min} and f_{max} by external resistors
- Low jitter
- Soft start for horizontal and B+ control drive signals.

Vertical section

- I^2C-bus controllable vertical picture size, picture position, linearity (S-correction) and linearity balance
- Output for I^2C-bus controllable vertical sawtooth and parabola (for pin unbalance and parallelogram)
- Vertical picture size independent of frequency
- Differential current outputs for DC coupling to vertical booster.
- 50 to 160Hz vertical autosync range.

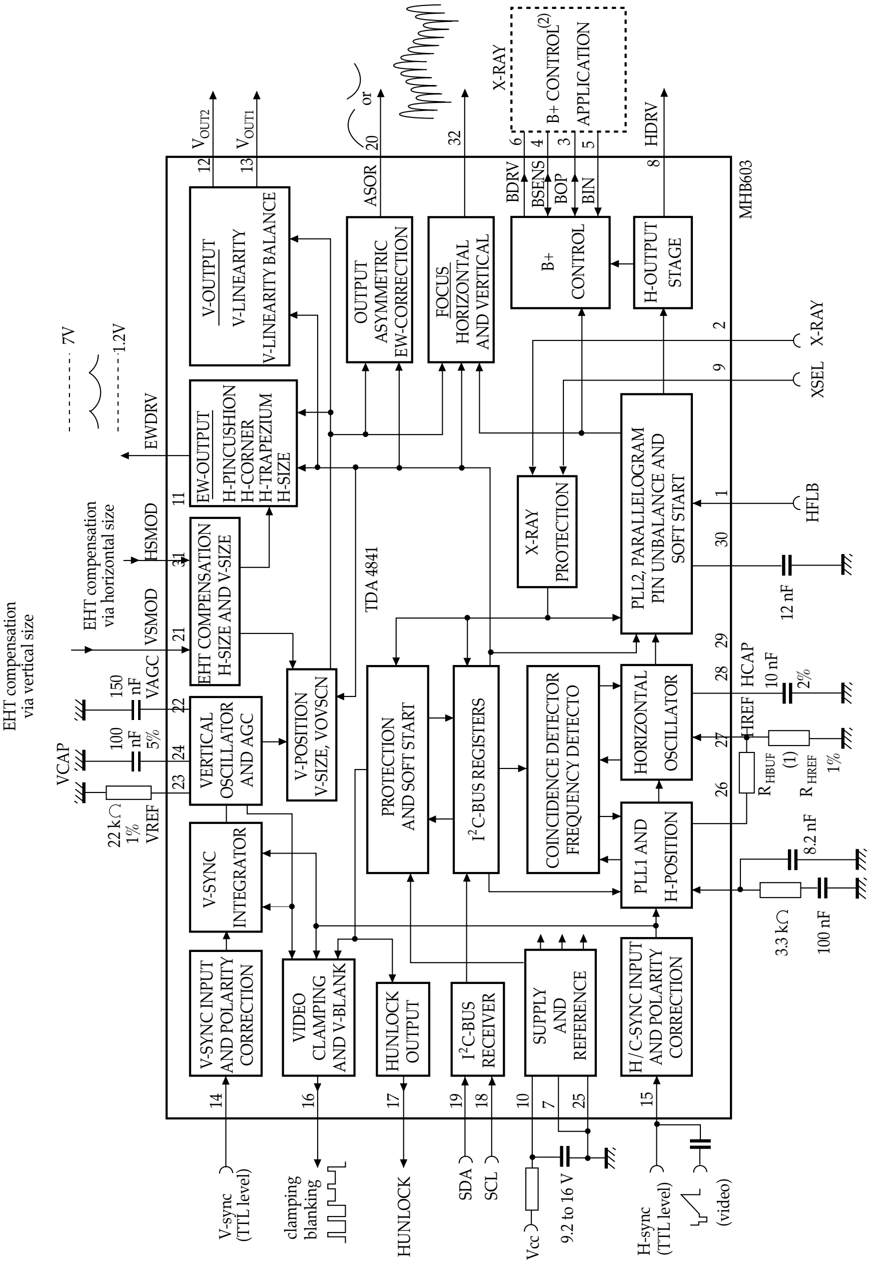
East-West (EW) section

- I^2C-bus controllable output for horizontal pincushion, horizontal size, corner and trapezium correction
- Optional tracking of EW drive waveform with line frequency selectable by I^2C-bus.

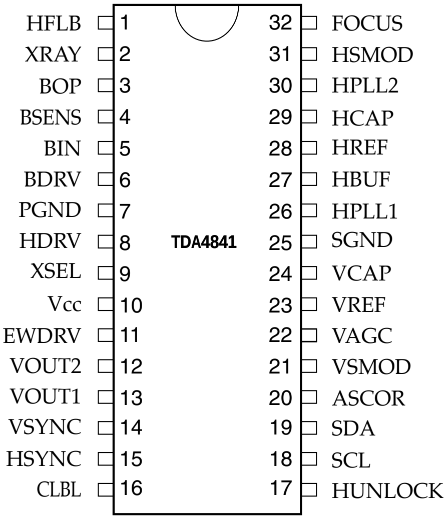
Focus section

- I^2C-bus controllable output for horizontal and vertical parabolas
- Vertical parabola is independent of frequency and tracks with vertical adjustments
- Horizontal parabola independent of frequency
- Adjustable pre-correction of delay in focus output stage.

BLOCK DIAGRAM


EHT compensation via vertical size
EHT compensation via horizontal size
VCAP
VREF
22 kΩ 1%
100 nF 5%
150 nF
VAGC
VSMOD
HSMOD
EWDRV
7V
1.2V
V-OUTPUT
V-LINEARITY
V-LINEARITY BALANCE
V_{OUT2}
V_{OUT1}
EW-OUTPUT
H-PINCUSHION
H-CORNER
H-TRAPEZIUM
H-SIZE
EHT COMPENSATION H-SIZE AND V-SIZE
VERTICAL OSCILLATOR AND AGC
V-POSITION V-SIZE, VOVSCN
V-SYNC INTEGRATOR
V-SYNC INPUT AND POLARITY CORRECTION
VIDEO CLAMPING AND V-BLANK
HUNLOCK OUTPUT
I^2C-BUS RECEIVER
SUPPLY AND REFERENCE
H/C-SYNC INPUT AND POLARITY CORRECTION
PROTECTION AND SOFT START
I^2C-BUS REGISTERS
COINCIDENCE DETECTOR FREQUENCY DETECTO
HORIZONTAL OSCILLATOR
PLL1 AND H-POSITION
PLL2, PARALLELOGRAM PIN UNBALANCE AND SOFT START
X-RAY PROTECTION
OUTPUT ASYMMETRIC EW-CORRECTION
FOCUS HORIZONTAL AND VERTICAL
B+ CONTROL
H-OUTPUT STAGE
TDA 4841
MHB603
ASOR
or
X-RAY
B+ CONTROL(2) APPLICATION
BDRV
BSENS
BOP
BIN
HDRV
X-RAY
XSEL
HFLB
12 nF
HCAP
10 nF 2%
HREF
R_{HBUF} (1)
R_{HREF} 1%
8.2 nF
3.3 kΩ
100 nF
V-sync (TTL level)
clamping blanking
HUNLOCK
SDA
SCL
Vcc
9.2 to 16 V
H-sync (TTL level)
(video)
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32

PIN CONFIGURATION



FUNCTIONAL DESCRIPTION

Horizontal sync separator and polarity correction

HSYNC (pin 15) is the input for horizontal synchrodization signals, which can be DC-coupled TTL signals (horizontal or composite sync) and AC-coupled negative-going video sync signals. Video syncs are clamped to 1.28V and sliced at 1.4V. This results in a fixed absolute slicing level of 120mV related to sync top.
For DC-coupled TTL signals the input clamping current is limited. The slicing level for TTL signals is 1.4V.
The separated sync signal (either video or TTL) is integrated on an internal capacitor to detect and normalize the sync polarity.
Normalized horizontal sync pulses are used as input Signals for the vertical sync integrator, the PLL1 phase detector and the frequency-locked loop.

Vertical sync integrator.

Normalized composite sync signals from HSYNC are integrated on an internal capacitor in order to extract vertical sync pulses. The integration time is dependent on the horizontal oscillator reference current at HREF (pin 28). The integrator output directly triggers the vertical oscillator.

Vertical sync slicer and polarity correction

Vertical sync signals (TTL) applied to VSYNC (pin 14) are sliced at 1.4V. The output signal of the sync slicer is integrated on an internal capacitor to detect and normalize the sync polarity. The output signals of vertical sync integrator and sync normalizer are disjuncted before they are fed to the vertical oscillator.

Video clamping vertical blanking generator

The video clamping vertical blanking signal at CLBL (pin 16) is a two-level sandcastle pulse which is especially suitable for video ICs such as the TDA488x family, but also for direct applications in video output stages.
The upper level is the video clamping pulse, which is triggered by the horizontal sync pulse. Via I^2C-bus Control either the leading or trailing edge can be selected by setting control bit CLAMP. The width of the video clamping pulse is determined by an internal single-shot multivibrator.
The lower level of the sandcastle pulse is the vertical blanking pulse, which is derived directly from the internal oscillator waveform. It is started by the vertical sync and stopped with the start of the vertical scan. This results in optimum vertical blanking. Via I^2C-bus Control two different vertical blanking times are accessible by control bit VBLK.
Blanking will be activated continuously, if one of the following conditions is true:
Soft start of horizontal and B+ drive (voltage at HPLL2 (pin 30) pulled down externally or by I^2C-bus)
PLL1 is unlocked while frequency-locked loop is in search mode
No horizontal flyback pulses at HFLB (pin 1)
X-Ray protection is activated
Supply voltage at Vcc (pin 10) is low see Fig.22
Via I^2C-bus Control horizontal unlock blanking can be switched off by control bit BLKDIS while vertical blanking is maintained.

Frequency-locked loop

The frequency locked loop can lock the horizontal oscillator over a wide frequency range. This is achieved by a combined search and PLL operation. The frequency range is preset by two external
resistors and the recommended maximum

ratio is $\frac{f_{max}}{f_{min}} = \frac{6.5}{1}$

This can, for instance, be a range from 15.625 to 90kHz with all tolerances included.
Whitout a horizontal sync signal the oscillator will be free-running at f_{mix} . Any change of sync conditions is detected by the unternal coinidence detector. A deviation of mpre than 4% between horizontal sync and oscillator frequency will switch the horizontal section into search mode. This means that PLL1 control currents are switched off immediately. The internal frequency detector then starts tuning the oscillator. Very small DC currents at HPLL1(pin26) are used to perform this tuning with a well defined change rate. When coincidence between horizontal sync and oscillator frequency is defected, the search mode is first replaced by a soft-lock mode which lasts for the first part of the next vertical period.

The soft-lock mode is than replaced by a normal PLL operation. This operation ensures a smooth tuning and avoids fast changes of horizontal frequency during catching.

In this concept it is not allowed to load HPLL1.
The frequency dependent voltage at this pin is fed internally to HBUF(pin27)via a sample-and-hold and buffer stage. The sample-and-hold stage removes all disturbanes caused by horizontal sync or compostite vertical sync from the buffered voltage. An external resistor connected between pins HBUF and HREF defines the frequency range.

Out-of-lock indication(pin HUNLOCK)
Pin hunlock is floating during search mode or if a protection condition is true.
All this can be detected by the microcontroller if a pull-up resistor is connected to its own supply voltage.

For an additional fast vertical blanking at grid 1 of the picture tube, alv signal referenced to ground is available at this output. Also the continuous protection blanking (see Section “Video clamping/vertical blanking generator”) is avallable at this pin. Via I2c-bus control, the control bit Blkdis Can switch off horizontal unlock blanking while vertical blanking is maintained.

Horizontal oscillator
The horizontal oscillator is of the relaxation type and requires a capacitor of 10 nF at HCAP(pin29).
For optimum jitter performance the value of 10nF must not be changed.

The minimum oscillator frequency is determined by a resistor connected between pin HREF and ground. A resistor connected between pins HREF and HBUF defines the frequency range.

The reference current at pin HREF also defines the integration time constant the vertical sync integration.

LM2479

120V Triple Bias Clamp

General Description

The LM2479 is an Integrated 120V triple bias clamp circuit for DC recovery of each of the AC coupled outputs of a CRT driver. It is well matched with the DAC outputs of the LM126X family of pre-amplifiers. Each amplifier has its gain internally set to -18. The IC is packaged in an industry standard 8 lead molded DIP package.

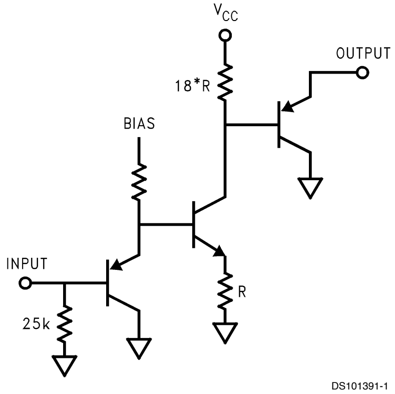
Features

- Wide range integrated triple bias clamp
- High input impedance
- Single supply operation
- Matched to the LM126X family of preamplifiers

Recommended Applications

- CRT monitors requiring DC restoration at the cathodes

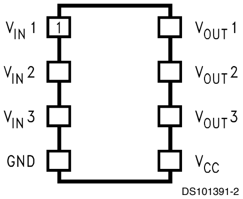
Block Diagrams



V_{CC}
OUTPUT
18*R
BIAS
INPUT
R
25k
DS101391-1

FIGURE 1. Simplified Schematic (One Channel)

Package Pinout



V_{IN} 1
1
V_{IN} 2
V_{IN} 3
GND
V_{OUT} 1
V_{OUT} 2
V_{OUT} 3
V_{CC}
DS101391-2

FIGURE 2. LM2479 Package Pinout
Order Number LM2479NA
NS Package Number: N08E

Absolute Maximum Ratings (Note 1)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/ Distributors for availability and specifications.

Supply Voltage, V_{CC}	+130V
Input Voltage, V_{IN}	0V to 5V
Storage Temperature Range, T_{STG}	-65℃ to +150℃
Lead Temperature (Soldering, <10sec.)	300℃
ESD Tolerance, Machine Model	200V

Limits of Operating Ranges (Note 3)

V_{CC}	110 to 125
V_{OUT}, V_{CC} = 120V	50 to 120V
Ambient Temperature Range, T_A	0 to 70℃

DC CLAMP ELECTRICAL CHARACTERISTICS TARGETS AND LIMIT

Unless otherwise noted: V_{CC} = +120V, V_{IN} = 2.25V_{DC}, T_A = 25 C.

Symbol	Spec Parameter	Conditions	Min	Typ	Max	Units
I_{CC}	Supply Current	All channels		2.3	3.5	mA
V_{OUT}	DC Output Voltage		83	87	91	V_{DC}
$V_{OUT\text{-}Range}$	Output Voltage Range	V_{IN} Range = 1.0V - 4.0V		53		V
A_V	DC Voltage Gain		-16	-18	-20	
LE	Linearity Error	See Note 1		5		%
R_{IN}	Input Resistance			24K		Ω

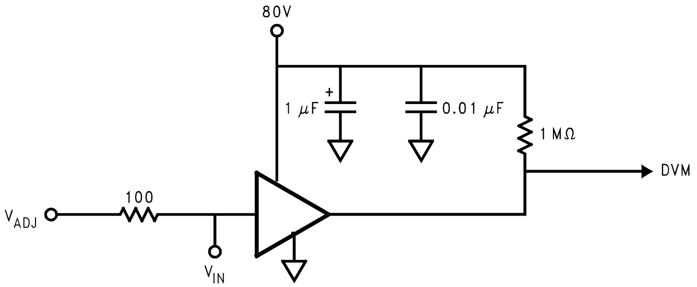
Note 1: Linearity Error is the variation in DC gain from V_{IN} = 1.0V to V_{IN} = 4.0V.

Note 2: Absolute Maximum Ratings indicate limits beyond which damage to the device may occur.

Note 3: Operating Ratings indicate conditions for which the device is functional, but do not guarantee specific performance limits. For guaranteed specifications and the test conditions, see the Electrical Characteristics. The guaranteed specifications apply only for the test conditions listed. Some performance characteristics may change when the device is not operated under the listed test conditions.

Note 4: All voltages are measured with respect to GND, unless otherwise specified.

Test Circuit



DS101391-3

FIGURE 3. Test Circuit (One Channel)

Figure 3 shows the test circuit for evaluation of the LM2479 Clamp Amplifier. A high impedance VM (>100MΩ) is used for DC measurements at the output.

LM1267

Monolithic Triple 7.5 ns CRT Driver

General Description

The LM2467 is an integrated high voltage CRT driver circuit designed for use in color monitor applications. The IC contains three high input impedance, wide band amplifiers which directly drive the RGB cathodes of a CRT. Each channel has its gain internally set to ¸20 and can drive CRT capacitive loads as well as resistive loads present in other applications, limited only by the package's power dissipation.

The IC is packaged in an industry standard 9-lead TO-220 molded plastic power package. See Thermal Considerations section.

Features

- Higher gain to match LM126X CMOS preamplifiers
- 0V to 3.75V input range
- Stable with 0±20 pF capacitive loads and inductive peaking networks

  Convenient TO-220 staggered lead package style
- Maintains standard LM243X Family pinout which is designed for easy PCB layout

Applications

- 1024 x 768 displays up to 85 Hz refresh
- Pixel clock frequencies up to 95 MHz
- Monitors using video blanking

Schematic and Connection Diagrams

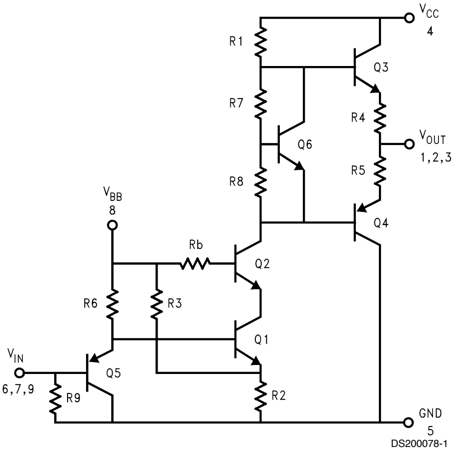
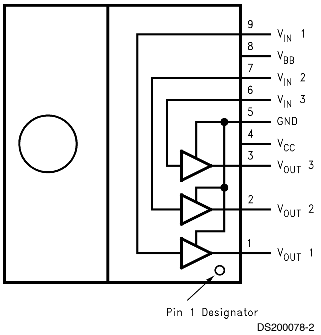

V_{CC}
4
R1
Q3
R7
R4
V_{OUT}
1,2,3
Q6
R5
R8
V_{BB}
8
Q4
Rb
Q2
R6
R3
Q1
V_{IN}
Q5
6,7,9
R9
R2
GND
5
DS200078-1

FIGURE 1. Simplified Schematic Diagram (One Channel)


9
V_{IN} 1
8
V_{BB}
7
V_{IN} 2
6
V_{IN} 3
5
GND
4
V_{CC}
3
V_{OUT} 3
2
V_{OUT} 2
1
V_{OUT} 1
Pin 1 Designator
DS200078-2

Note: Tab is at GND

Top View
Order Number LM2467T

Absolute Maximum Ratings (Notes 1, 3)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/ Distributors for availability and specifications.

Supply Voltage, Pin 9	6.0V
Peak Video Output Source Current (Any One Amp) Pins 18, 19 or 20	28 mA
Voltage at Any Input Pin (V_{IN})	V_{CC} +0.5 > V_{IN} > - 0.5V
Power Dissipation (P_D) (Above 25 C Derate based on θ_{JA} and T_J)	2.4W
Thermal Resistance to Ambient (θ_{JA})	51 C/W
Thermal Resistance to Case (θ_{JC})	32 C/W
Junction Temperature (T_J)	150 C
ESD Susceptibility (Note 4)	3.5 kV
ESD Machine Model (Note 5)	350V
Storage Temperature	-65 C to +150 C
Lead Temperature (Soldering, 10 sec.)	265 C

Operating Ratings (Note 2)

Temperature Range	0 C to 70 C
Supply Voltage (V_{CC})	4.75V < V_{CC} < 5.25V
Video Inputs	0.0V < V_{IN} < 1.2V

Active Video Signal Electrical Characteristics

Unless otherwise noted: T_A = 25 C, V_{CC} = +5V, V_{IN} = 0.7V, V_{ABL} = V_{CC}, C_L = 8 pF, Video Output = 3.5 V_{P-P}.

Symbol	Parameter	Conditions	Min (Note 7)	Typ (Note 6)	Max (Note 7)	Units
I_S	Maximum Supply Current	Test Setting 1, R_L = ∞ (Note 8)		210	235	mA
$I_{S\text{-}PS}$	Maximum Supply Current, Power Save Mode	Test Setting 1, R_L = ∞, Bit 1 of Reg. 9 = 1 (Note 8)		45	60	mA
LE	Linearity Error	Test Setting 4, Triangular signal input source (Note 9)		5		%
$V_{O\ Blk\ Typ}$	Typical Video Black Level Output	Test Setting 4, No AC Input Signal, DC = 5 Hex, or 0.5V Offset	1.05	1.25	1.45	VDC
$V_{O\ Blk\ Step}$	Video Black Level Step Size	Test Setting 4, No AC Input Signal	60	90	120	mV
$\Delta V_O/\Delta V_{CC}$	Variation in Output Video Black Level vs V_{CC} Variations	Test Setting 1 & 3, No AC Input Signal, 4.75<V_{CC}<5.25	-50	0	50	mV/V
$V_{O\ White\text{-}Max}$	White Level Video Output Voltage	Test Setting 3, Video in = 0.7V	4.0	4.2		V
V_{Blank}	Blanked Output Level	Test Setting 4, AC Input Signal	0	0.2	0.5	V
t_r	Rise Time	10% to 90%, Test Setting 4, AC Input Signal (Note 10)		3.0		ns
OS_R	Overshoot (Rising Edge)	Test Setting 4, AC Input Signal (Note 10)		8		%
t_f	Fall Time	10% to 90%, Test Setting 4, AC Input Signal (Note 10)		3.0		ns
OS_F	Overshoot (Falling Edge)	Test Setting 4, AC Input Signal (Note 10)		8		%
f(¸3 dB)	Video Amplifier Bandwidth (Note 13)	Test Setting 8, Register 0Bh Bits 2-0 Set to 111, V_O = 3.5 $V_{P\text{-}P}$		150		MHz
V_{sep} 10 kHz	Video Amplifier 10 kHz Isolation	Test Setting 8 (Note 14)		-70		dB
V_{sep} 10 MHz	Video Amplifier 10 MHz Isolation	Test Setting 8 (Note 14)		-50		dB
$A_{V\ Max}$	Maximum Voltage Gain	Test Setting 8, AC Input Signal		4		V/V
$A_{V\ {}^{1}\S}$	Contrast @ 50% Level	Test Setting 5, AC Input Signal		-10		dB
$A_{V\ Min}$	Maximum Contrast Attenuation	Test Setting 2, AC Input Signal		-20		dB
$A_{V\ Gain\ {}^{1}\S}$	Gain @ 50% Level	Test Setting 6, AC Input Signal		-5		dB
$A_{V\ Gain\ Min}$	Maximum Gain Attenuation	Test Setting 7, AC Input Signal		-10		dB
$A_{V\ Match}$	Absolute Gain Match @ A_{Vmax}	Test Setting 3, AC Input Signal		+/- 0.5		dB

Active Video Signal Electrical Characteristics (Continued)

Unless otherwise noted: T_A = 25 C, V_{CC} = +5V, V_{IN} = 0.7V, V_{ABL} = V_{CC}, C_L = 8 pF, Video Output = 3.5 V_{P-P}.

Symbol	Parameter	Conditions	Min (Note 7)	Typ (Note 6)	Max (Note 7)	Units
$A_{V\ Track}$	Gain Change between Amplifiers	Tracking when Changing from Test Setting 8 to Test Setting 5 (Note 11)		†0.5		dB
$V_{ABL\ TH}$	ABL Control Upper Limit	Test Setting 4, AC Input Signal (Note 12)		5		V
$V_{ABL\ Range}$	ABL Control Voltage Active Range	Test Setting 4, AC Input Signal (Note 12)		2		V
ΔA_{ABL}	ABL Control Range	Test Setting 4, AC Input Signal (Note 12)		-10		dB
$I_{ABL\ Active}$	ABL Input Bias Current during ABL	Test Setting 4, AC Input Signal, V_{ABL} = 2V(Note 12)		0	10	uA
$I_{ABL\ Max}$	ABL Input Current Clamp Sink Capability	Test Setting 4, AC Input Signal (Note 12)			1	mA
$V_{Clamp\ Max}$	Clamp Gate Low Input Voltage	Clamp Comparators Off			1.4	V
$V_{Clamp\ Min}$	Clamp Gate High Input Voltage	Clamp Comparators On	2.6			V
I_{Clamp}	Clamp Gate Input Current	V_{23} = 0V to V_{CC} ˛ 1V	-5	0.1	10	uA
$t_{PW\ Clamp}$	Back Porch Clamp Pulse Width	(Note 15)	200			ns
$t_{Clamp-Video}$	End of Clamp Pulse to Start of Active Video	Limit is guaranteed by design	200			nsec
$R_{in-Video}$	Input Resistance	Test Setting (4)		20		MΩ
$I_{in-Video}$	Input Bias Current	Test Setting (4)		0.1	10	uA
V_{Ref}Out	V_{Ref} Output Voltage	10 kΩ, 1% Resistor; Pin 10 to GND	1.25	1.40	1.55	V
V_{Spot}	Spot Killer Voltage	V_{CC} Adjusted to Activate	3.75	4.0	4.25	V

OSD Electrical Characteristics

Unless otherwise noted: T_A = 25 C, V_{CC} = +5V, V_{IN} = 0.7V, V_{ABL} = V_{CC}, C_L = 8 pF, Video Signal Output = 3.5 V_{P-P}, Test Setting 8.

Symbol	Parameter	Conditions	Min (Note 7)	Typ (Note 6)	Max (Note 7)	Units
V_{OSD-L}	OSD Input Low Input Operating Range	OSD Inputs are Selected			1.2	V
V_{OSD-H}	OSD Input High Input Operating Range	OSD Inputs are Selected	2.5			V
I_{OSD}	OSD Input Current	V_{OSD} = 0V to V_{CC} ˛ 1V	-5	0.1	10	uA
$V_{OSD-Sel-L}$	OSD Select Low Input Operating Range	Video Inputs are Selected			1.2	V
$V_{OSD-Sel-H}$	OSD Select High Input Operating Range	OSD Inputs are Selected	2.5			V
$I_{OSD-Sel}$	OSD Select Input Current	$V_{OSD-Sel}$ = 0V to V_{CC} ˛ 1V	-5	0.1	10	uA
$\Delta V_{O-OSD(Blk)}$	OSD ΔBlack Level Output Voltage, Difference from Video Output	Register 08=18, Minimum Video Black Level		†45	†150	mV
$V_{O-OSD(Blk)}$	Range of OSD Black Level Output Voltage between the 3 Channels	Register 08=18, Minimum Video Black Level	-100	0	+100	mV
$V_{OSD-out}$	OSD Output Voltage, Percent of Maximum Video Out	Register 08 = 08, Minimum Video Black Level	69	79	89	%
$\Delta V_{OSD-out}$	OSD Output V_{P-P} Attenuation	Register 08 = 08	55	60	65	%
$V_{OSD-out}$ (Track)	Output Variation between Channels	Register 08 Changed from 18 to 08		+/- 3.0	+/- 5.0	%

OSD Electrical Characteristics (Continued)

Unless otherwise noted: T_A = 25 C, V_{CC} = +5V, V_{IN} = 0.7V, V_{ABL} = V_{CC}, C_L = 8 pF, Video Signal Output = 3.5 V_{P-P}, Test Setting 8.

Symbol	Parameter	Conditions	Min (Note 7)	Typ (Note 6)	Max (Note 7)	Units
$\Delta t_{OSD/OSD\ S}$	Output Skew Time between OSD and OSD Select	Measured from 50% Point on all Waveforms		+/-2.0		ns
V_{feed} 10 kHz	Video Feedthrough into OSD	OSD Inputs = 0V		-70		dB
V_{feed} 10 MHz	Video Feedthrough into OSD	OSD Inputs = 0V		-60		dB

External DAC Signals Electrical Characteristics

Unless otherwise noted: T_A = 25 C, V_{CC} = +5V, V_{IN} = 0.7V, V_{ABL} = V_{CC}, C_L = 8 pF, Video Signal Output = 3.5 V_{P-P}. The following apply for all four external DACS.

Symbol	Parameter	Conditions	Min (Note 7)	Typ (Note 6)	Max (Note 7)	Units
$V_{Min\ DAC}$	Min DAC Output Voltage	Value = 00h		0.5	0.65	V
$V_{Max\ DAC}$ Mode 00	Max DAC Output Voltage	Value = FFh, DCF[1:0]=00h (no load)	3.7	4.2		V
$V_{Max\ DAC}$ Mode 11	Max Output Voltage of DACs 1±3 in DCF Mode 11	Value = FFh, DCF[1:0]=11h, DAC4 Value = 00h	1.85	2.1	2.35	V
$\Delta V_{Max\ DAC}$ (Temp)	Variation of any DAC output voltage with temperature	0 C<T<70 C ambient		+/-0.5		mV/deg
$\Delta V_{Max\ DAC}$ (V_{CC})	Variation of any DAC output voltage with V_{CC}	4.75V<V_{CC}<5.25V		+/-50		mV/V
Linearity	Linearity of DAC Over its Range			5		%
Monotonicity	Monotonicity of the DAC	Excluding dead zones at limits of DAC		+/-0.5		LSB

External Interface Signals Electrical Characteristics

Unless otherwise noted: T_A = 25 C, V_{CC} = +5V, V_{IN} = 0.7V, V_{ABL} = V_{CC}, C_L = 8 pF, Video Output = 3.5 V_{P-P}.

Symbol	Parameter	Conditions	Min (Note 7)	Typ (Note 6)	Max (Note 7)	Units
$V_l(I^2C)$	I^2C Low Input Voltage	SDA or SCL Inputs	-0.5	0.5	1.5	V
$V_h(I^2C)$	I^2C High Input Voltage	SDA or SCL Inputs	3.0	4.0	5.0	V
$I_l(I^2C)$	I^2C Low Input Current	SDA or SCL Inputs, Input Voltage = 0V	1.9	2.2	2.5	uA
$I_h(I^2C)$	I^2C High Input Current	SDA or SCL Inputs, Input Voltage = 5V	0.3	0.6	0.9	uA
$t_{H\text{-}Blank\ on}$	H-Blank Time Delay from Zero Crossing Point of H Flyback	Rising Edge of the Flyback Signal		50		ns
$t_{Blank\ off}$	H-Blank Time Delay from Zero Crossing Point of H Flyback	Falling Edge of the Flyback Signal		50		ns
$I_{InThreshold}$	I_{In} H-Blank Detection Threshold			-20		uA
$I_{In\text{-}Operating}$	Minimum– Insure Normal Operation Maximum– Should Not Exceed in Normal Operation	Lowest Operating Horizontal Frequency in Given Application	-30		-300	uA
$I_{In\ Flyback}$	Peak Current during Flyback Period, Recommended Design Range	Operating Range for all Horizontal Scan Frequencies, Maximum Current Should Not Exceed 2 mA	0.5	1.5	2.0	mA

Note 1: Limits of Absolute Maximum Ratings indicate limits below which damage to the device must not occur.

Note 2: Limits of operating ratings indicate required boundaries of conditions for which the device is functional, but may not meet specific performance limits.

External Interface Signals Electrical Characteristics (Continued)

Note 3: All voltages are measured with respect to GND, unless otherwise specified.

Note 4: Human body model, 100 pF discharged through a 1.5 kΩ resistor.

Note 5: Machine Model ESD test is covered by specification EIAJ IC-121-1981. A 200 pF cap is charged to the specified voltage, then discharged directly into the IC with no external series resistor (resistance of discharge path must be under 50Ω).

Note 6: Typical specifications are specified at +25 C and represent the most likely parametric norm.

Note 7: Tested limits are guaranteed to National's AOQL (Average Outgoing Quality Level).

Note 8: The supply current specified is the quiescent current for V_{CC} with $R_L = \infty$. Load resistors are not required and are not used in the test circuit, therefore all the supply current is used by the pre-amp.

Note 9: Linearity Error is the variation in step height of a 16 step staircase input signal waveform with 0.7 $V_{P\text{-}P}$ level at the input, subdivided into 16 equal steps, with each step approximately 100 ns in width.

Note 10: Input from signal generator: t_r, $t_f < 1$ ns.

Note 11: ΔA_V track is a measure of the ability of any two amplifiers to track each other and quantifies the matching of the three gain stages. It is the difference in gain change between any two amplifiers with the contrast set to A_V ¹§□and measured relative to the A_V max condition. For example, at A_V max the three amplifiers' gains might be 12.1 dB, 11.9 dB, and 11.8 dB and change to 2.2 dB, 1.9 dB and 1.7 dB respectively for contrast set to A_V ¹§□This yields a typical gain change of 10.0 dB with the tracking change of †□2 dB.

Note 12: ABL should provide smooth decrease in gain over the operational range of 0 dB to ±5 dB

$$\Delta A_{ABL} = A(V_{ABL} = V_{ABL\ Max\ Gain}) -\square A(V_{ABL} = V_{ABL\ Min\ Gain})$$

Beyond ±5 dB the gain characteristics, linearity and pulse response may depart from normal values.

Note 13: Adjust input frequency from 10 MHz (A_V max reference level) to the ¸3 dB corner frequency ($f_{¸3\ dB}$).

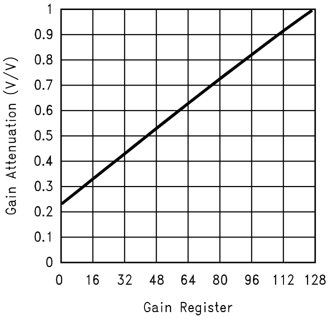
Note 14: Measure output levels of the other two undriven amplifiers relative to the driven amplifier to determine channel separation. Terminate the undriven amplifier inputs to simulate generator loading. Repeat test at f_{IN} = 10 MHz for $V_{sep\ 10\ MHz}$.

Note 15: A minimum pulse width of 200 ns is guaranteed for a horizontal line of 15 kHz. This limit is guaranteed by design. If a lower line rate is used then a longer clamp pulse may be required.

Note 16: The video black level is used for this test. OSD amplitude is measured from the video black level to the OSD white level.

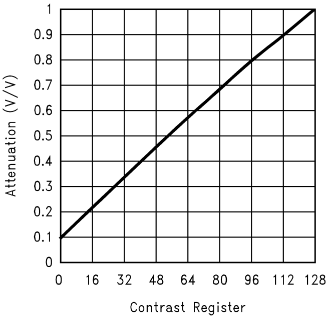
Typical Performance Characteristics V_{CC} = 5V, T_A = 25 □unless otherwise specified.

Gain Attenuation



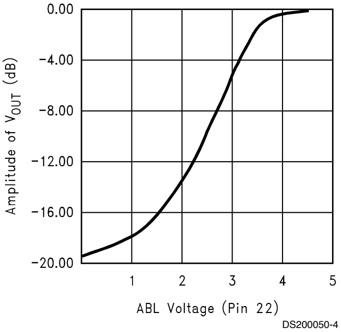
DS200050-2

Contrast Attenuation



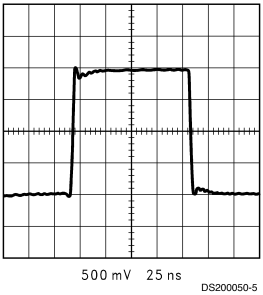
DS200050-3

ABL Attenuation



DS200050-4

Output Waveform



DS200050-5

LM2465

Monolithic Triple 5.5 ns High Gain CRT Driver

General Description

The LM2465 is an integrated high voltage CRT driver circuit designed for use in color monitor applications. The IC contains three high input impedance, wide band amplifiers which directly drive the RGB cathodes of a CRT. Each channel has its gain internally set to -20 and can drive CRT capacitive loads as well as resistive loads present in other applications, limited only by the package's power dissipation.

The IC is packaged in an industry standard 9-lead TO-220 molded plastic package.

Features

- Higher gain to match LM126X CMOS preamplifiers
- 0V to 3.75V input range
- Stable with 0±20 pF capacitive loads and inductive peaking networks
- Same pinout as LM2467/8/9, maintaining the standard LM243X Family pinout for easy PCB layout
- Convenient TO-220 staggered lead package style

Applications

- Up to 1280 x 1024 at 75Hz
- Pixel clock frequencies up to 135 MHz
- Monitors using video blanking

Schematic and Connection Diagrams

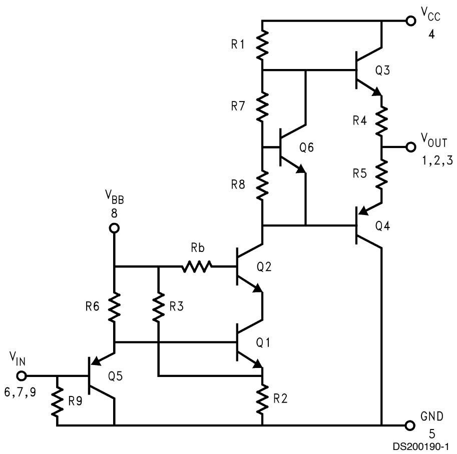
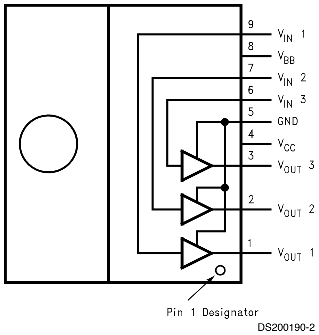

V_{CC}
4
R1
Q3
R7
R4
V_{OUT}
1,2,3
Q6
R8
R5
Q4
V_{BB}
8
Rb
Q2
R6
R3
Q1
V_{IN}
6,7,9
Q5
R9
R2
GND
5
DS200190-1

FIGURE 1. Simplified Schematic Diagram (One Channel)


9
V_{IN} 1
8
V_{BB}
7
V_{IN} 2
6
V_{IN} 3
5
GND
4
V_{CC}
3
V_{OUT} 3
2
V_{OUT} 2
1
V_{OUT} 1
Pin 1 Designator
DS200190-2

Note: Tab is at GND

Top View
Order Number LM2465TA

Absolute Maximum Ratings (Notes 1, 3)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Supply Voltage (V_{CC})	+90V
Bias Voltage (V_{BB})	+16V
Input Voltage (V_{IN})	0V to 4.5V
Storage Temperature Range (T_{STG})	-65 C to +150 C
Lead Temperature (Soldering, $<$10 sec.)	300 C
ESD Tolerance, Human Body Model	2 kV
Machine Model	250V

Operating Ranges (Note 2)

V_{CC}	+60V to +85V
V_{BB}	+8V to +15V
V_{IN}	+0V to +3.75V
V_{OUT}	+15V to +75V
Case Temperature	-20 C to +100 C

Do not operate the part without a heat sink.

Electrical Characteristics

(See *Figure 2* for Test Circuit)
Unless otherwise noted: V_{CC} = +80V, V_{BB} = +12V, C_L = 8 pF, T_C = 50 C
DC Tests: V_{IN} = 2.25VDC
AC Tests: Output = 40V_{PP} (25V - 65V) at 1MHz

Symbol	Parameter	Conditions	LM2465			Units
			Min	Typical	Max	
I_{CC}	Supply Current	All Three Channels, No Input Signal, No Output Load		36	44	mA
I_{BB}	Bias Current	All Three Channels		20	24	mA
V_{OUT}	DC Output Voltage	No AC Input Signal, V_{IN} = 1.25V	62	65	68	V_{DC}
A_V	DC Voltage Gain	No AC Input Signal	-18	-20	-22	
ΔA_V	Gain Matching	(Note 4), No AC Input Signal		1.0		dB
LE	Linearity Error	(Notes 4, 5), No AC Input Signal		5		%
t_R	Rise Time	(Note 6), 10% to 90%		5.5		ns
t_F	Fall Time	(Note 6), 90% to 10%		6.0		ns
OS	Overshoot	(Note 6)		3		%

Note 1: Absolute Maximum Ratings indicate limits beyond which damage to the device may occur.

Note 2: Operating ratings indicate conditions for which the device is functional, but do not guarantee specific performance limits. For guaranteed specifications and test conditions, see the Electrical Characteristics. The guaranteed specifications apply only for the test conditions listed. Some performance characteristics may change when the device is not operated under the listed test conditions.

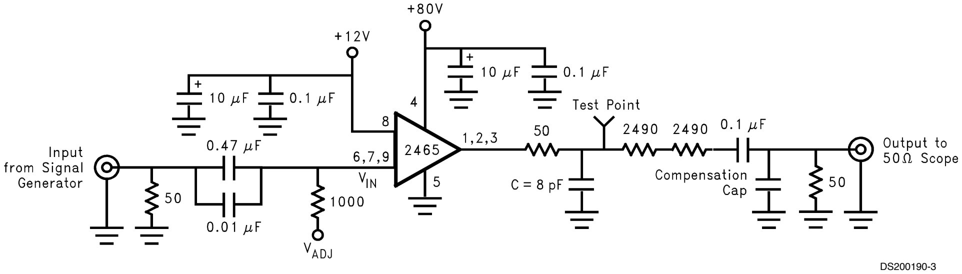
Note 3: All voltages are measured with respect to GND, unless otherwise specified.

Note 4: Calculated value from Voltage Gain test on each channel.

Note 5: Linearity Error is the variation in dc gain from V_{IN} = 1.0V to V_{IN} = 3.5V.

Note 6: Input from signal generator: t_r, t_f $<$ 1 ns.

AC Test Circuit


+80V
+12V
10 µF
0.1 µF
10 µF
0.1 µF
Test Point
8
4
0.47 µF
1,2,3
50
2490
2490
0.1 µF
Input
from Signal
Generator
6,7,9
2465
Output to
50Ω Scope
V_{IN}
5
C = 8 pF
Compensation
Cap
50
1000
50
0.01 µF
V_{ADJ}
DS200190-3

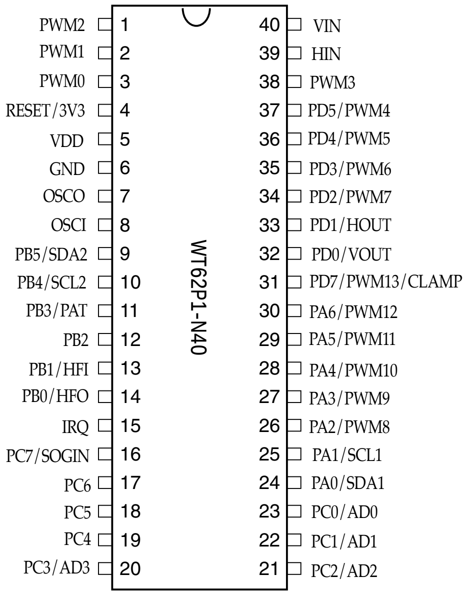
Note: 8 pF load includes parasitic capacitance.

FIGURE 2. Test Circuit (One Channel)

Figure 2 shows a typical test circuit for evaluation of the LM2465. This circuit is designed to allow testing of the LM2465 in a 50Ω environment without the use of an expensive FET probe. The two 2490Ω resistors form a 200:1 divider with the 50Ω resistor and the oscilloscope. A test point is included for easy use of an oscilloscope probe.The compensation capacitor is used to compensate the stray capacitance of the two 2490Ω resistors to achieve flat frequency response.

WT62PI

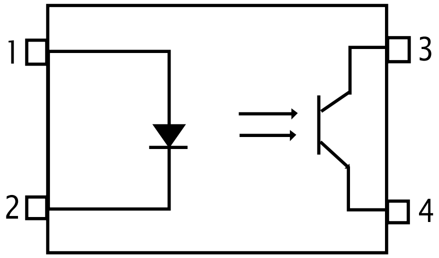
PIN CONNECTIONS


PWM2 1
PWM1 2
PWM0 3
RESET/3V3 4
VDD 5
GND 6
OSCO 7
OSCI 8
PB5/SDA2 9
PB4/SCL2 10
PB3/PAT 11
PB2 12
PB1/HFI 13
PB0/HFO 14
IRQ 15
PC7/SOGIN 16
PC6 17
PC5 18
PC4 19
PC3/AD3 20
40 VIN
39 HIN
38 PWM3
37 PD5/PWM4
36 PD4/PWM5
35 PD3/PWM6
34 PD2/PWM7
33 PD1/HOUT
32 PD0/VOUT
31 PD7/PWM13/CLAMP
30 PA6/PWM12
29 PA5/PWM11
28 PA4/PWM10
27 PA3/PWM9
26 PA2/PWM8
25 PA1/SCL1
24 PA0/SDA1
23 PC0/AD0
22 PC1/AD1
21 PC2/AD2
WT62P1-N40

PIN DESCRIPTION

1	-	21	UNLOCK
2	-	22	ABL
3	-	23	Key-in
4	Reset	24	SDA1
5	+5V	25	SCL1
6	GND	26	CS5
7	OSC0	27	CS4
8	OSC1	28	CS3
9	SUS/Stand-by	29	CS2
10	off (not used)	30	CS1
11	H-mute	31	Clamp
12	Direction	32	V-out
13	Degauss	33	H-out
14	BNC/D-Sub	34	sub size
15	ENCODER	35	Brt
16	LED1	36	H-Lin
17	LED2	37	TILT
18	-	38	ACL
19	SCL	39	H-Sync
20	SDA	40	V-Sync

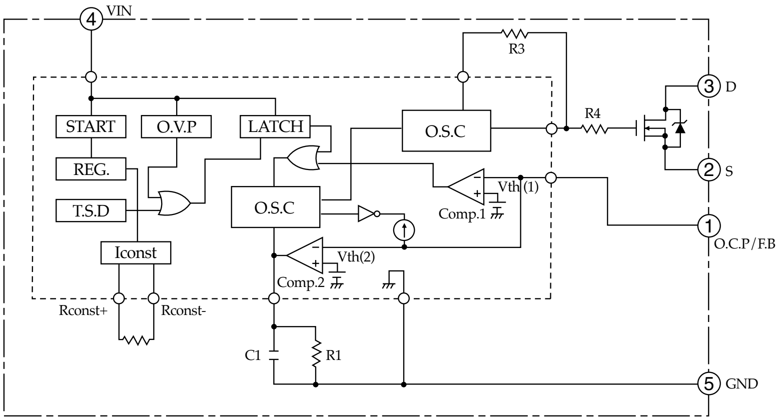
TLP621DS



1 : ANODE
2 : CATHODE
3 : EMITTER
4 : COLLECTOR

STR-F6654

BLOCK DIAGRAM


4 VIN
R3
3 D
R4
START
O.V.P
LATCH
O.S.C
REG.
T.S.D
O.S.C
2 S
Vth (1)
Comp.1
1 O.C.P/F.B
Iconst
Vth(2)
Comp.2
Rconst+
Rconst-
C1
R1
5 GND

Function of Terminal

Terminal No.	Symbols	Description	Functions
1	O.C.P/F.B	Overcurrent/Feedback terminal	Input of overcurrent detection signal and constant voltage control signal
2	S	Source terminal	MOS FET source
3	D	Drain terminal	MOS FET drain
4	VIN	Power supply terminal	Input of power supply for control circuit
5	GND	Ground terminal	Ground

Other Function

Symbols	Functions
O.V.P	Built-in overvoltage protection circuit
T.S.D	Built-in thermal shutdown circuit

Internal Constants

R1	T_{OFF} Adjustment Trimming Resistor	R4	10 Ω
R2	I_{const} Adjustment Trimming Resistor	C1	4700pF
R3	150 Ω		

MC33260

GreenLine Compact Power Factor Controller: Innovative Circuit for Cost Effective Solutions

The MC33260 is a controller for Power Factor Correction preconverters meeting international standard requirements in electronic ballast and of f±line power conversion applications. Designed to drive a free frequency discontinuous mode, it can also be synchronized and in any case, it features very effective protections that ensure a safe and reliable operation.

This circuit is also optimized to offer extremely compact and cost effective PFC solutions. While it requires a minimum number of external components, the MC33260 can control the follower boost operation that is an innovative mode allowing a drastic size reduction of both the inductor and the power switch. Ultimately system cost is significantly lowered.

Also able to function in a traditional way (constant output voltage regulationlevel), any intermediary solutions can be easily implemented. This flexibility makes it ideal to optimally cope with a wide range of applications.

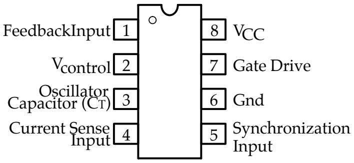
General Features

- Standard Constant Output Voltage or ™Follower Boostƒ Mode
- Switch Mode Operation: Voltage Mode
- Latching PWM for Cycle±by±Cycle On±Time Control
- Constant On±Time Operation That Saves the Use of an Extra Multiplier
- Totem Pole Output Gate Drive
- Undervoltage Lockout with Hysteresis
- Low Start±Up and Operating Current
- Improved Regulation Block Dynamic Behavior
- Synchronization Capability
- Internally Trimmed Reference Current Source

Safety Features

- Overvoltage Protection: Output Overvoltage Detection
- Undervoltage Protection: Protection Against Open Loop
- Effective Zero Current Detection
- Accurate and Adjustable Maximum On±Time Limitation
- Overcurrent Protection
- ESD Protection on Each Pin

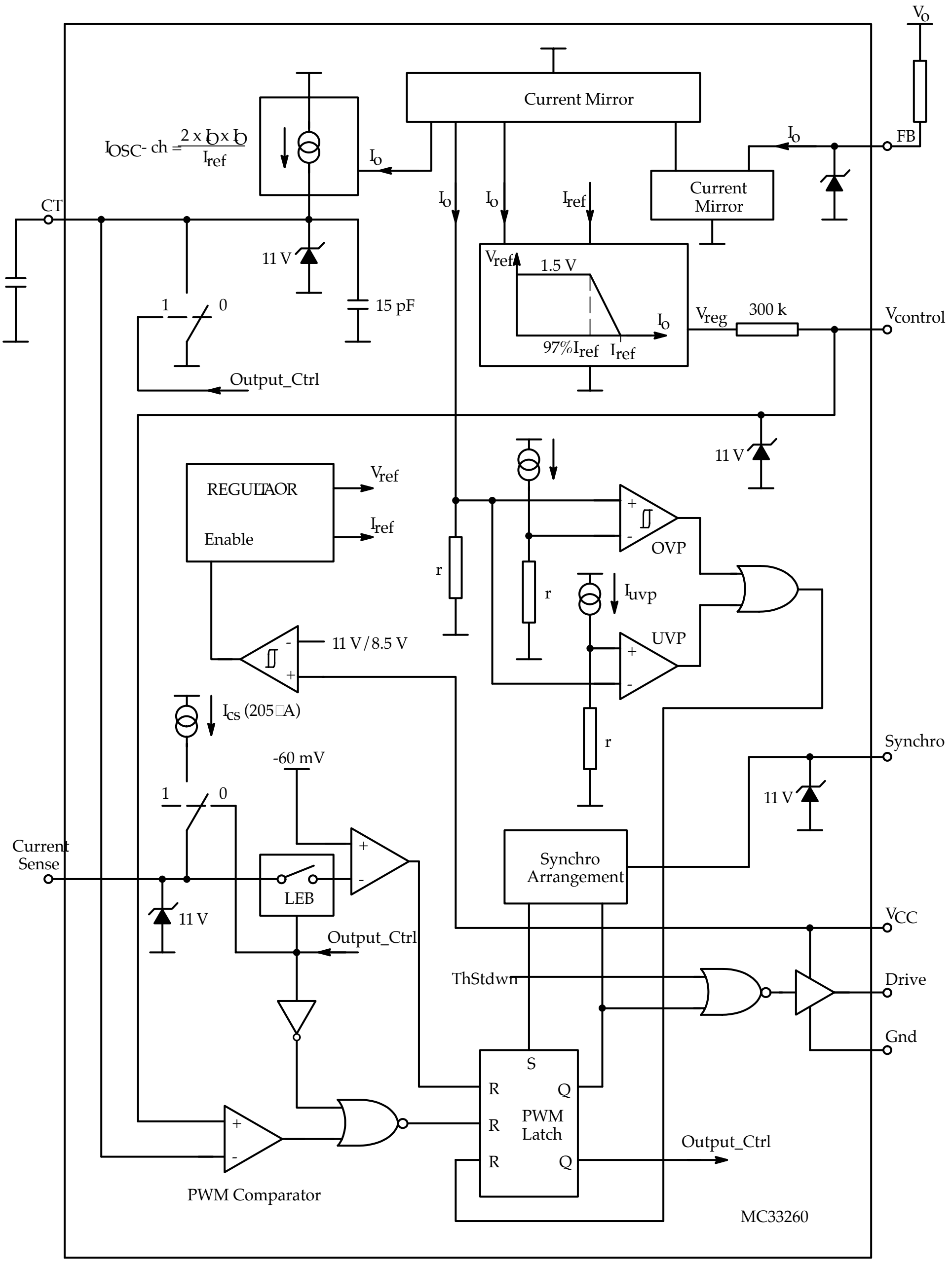
PIN CONNECTIONS



MC33260P

MC33260

BLOCK DIAGRAM


Vo
FB
Io
Current Mirror
Current Mirror
Io
IOSC- ch = 2 x Io x Io / Iref
Io
Io
Iref
CT
11 V
1
0
15 pF
Output_Ctrl
Vref
1.5 V
Io
97%Iref
Iref
Vreg
300 k
Vcontrol
11 V
REGULTAOR
Enable
Vref
Iref
OVP
r
r
Iuvp
UVP
11 V/8.5 V
r
ICS (205 A)
-60 mV
1
0
Synchro
11 V
Current Sense
LEB
11 V
Output_Ctrl
Synchro Arrangement
VCC
ThStdwn
Drive
Gnd
S
R
Q
R
PWM Latch
R
Q
Output_Ctrl
PWM Comparator
MC33260

KA2142

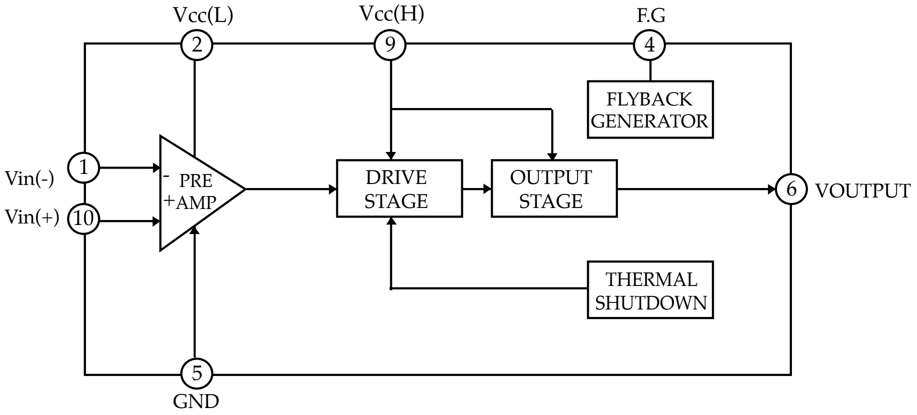

Vcc(L)
2
Vcc(H)
9
F.G
4
FLYBACK GENERATOR
Vin(-)
1
Vin(+)
10
-
+
PRE AMP
DRIVE STAGE
OUTPUT STAGE
6
VOUTPUT
THERMAL SHUTDOWN
5
GND

Table1. Pin Configurations

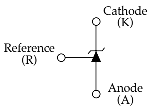
Pin No	Symbol	I / O	Configurations
1	Vin (-)	I	Inverting Input
2	Vcc (L)	I	Supply Voltage
3	-	-	N.C
4	F . G	O	Flyback Generator
5	GND	-	Ground
6	VD	O	Output
7	-	-	N.C
8	-	-	N.C
9	Vcc (H)	I	Output Stage Voltage
10	Vin (+)	I	Non-Inverting Input

LM431

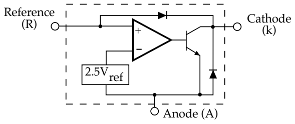
PROGRAMMABLE PRECISION REFERENCES
SILICON MONOLITHIC INTEGRATED CIRCUIT

- Programmable Output Voltage to 36V
- Voltage Reference Tolerance : ± 0.4% , Typ@ 25°C (TL431B)
- Low Dynamic Output Impedance, 0.22Ω Typical
- Sink Current Capability of 1.0mA to 100mA
- Equivalent Full-Range Temperature coefficient of 50 ppm/°C Typical
- Temperature Compensated for Operation over full Rated Operating Temperature Range.
- Low Output Noise Voltage

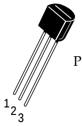
SYMBOL


Cathode
(K)
Reference
(R)
Anode
(A)

FUNCTIONAL BLOCK DIAGRAM


Reference
(R)
Cathode
(k)
+
−
2.5V ref
Anode (A)

INTERNAL SCHEMATIC
Component values are nominal



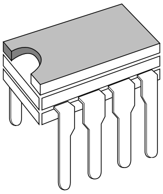
Pin 1. Reference
2. Anode
3. Cathode

LP SUFFIX CASE 92
(TO-92)

KA3843B

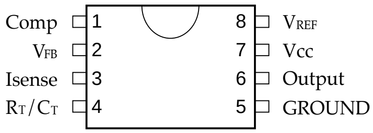
CURRENT MODE PWM CONTROLLER

- OPTIMIZED FOR OFF-LINE AND DC TO DC CONVERTERS
- LOW START-UP CURRENT(<1mA)
- AUTOMATIC FEED FORWARD COMPENSATION
- PULSE-BY-PULSE CURRENT LIMITING
- ENHANCED LOAD RESPONSE CHARACTERISTICS
- UNDER-VOLTAGE LOCKOUT WITH HYSTERESIS
- DOUBLE PULSE SUPPRESSION
- HIGH CURRENT TOTEM POLE OUTPUT
- INTERNALLY TRIMMED BANDGAP REFERENCE
- 500KHz OPERATION
- LOW Ro ERROR AMP



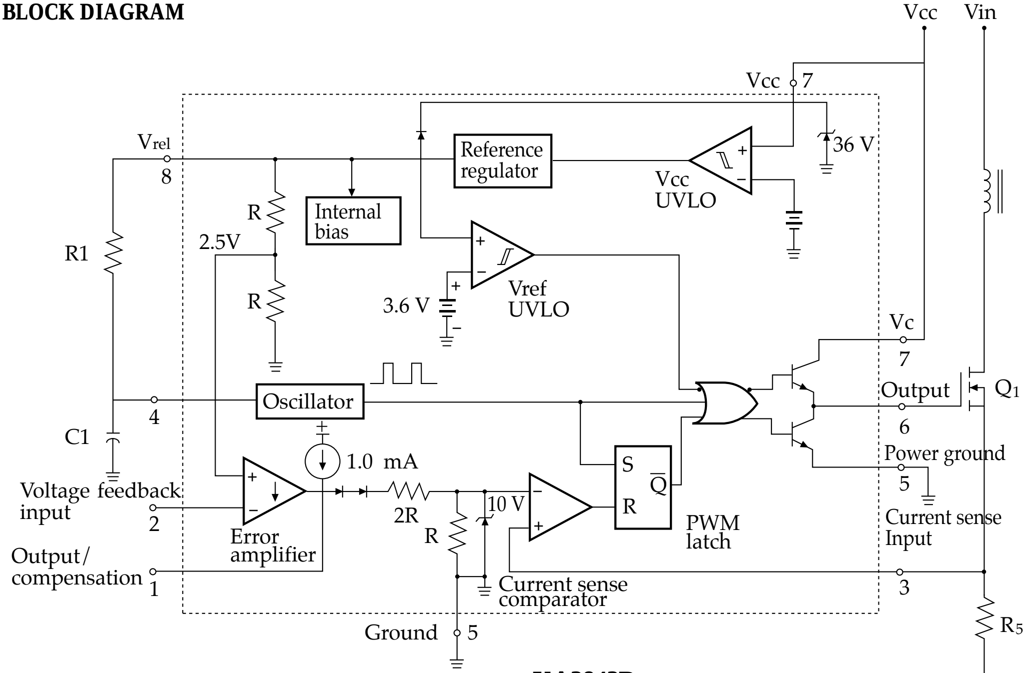
Minidip

PIN CONNECTION



Comp 1
VFB 2
Isense 3
RT/CT 4
8 VREF
7 Vcc
6 Output
5 GROUND

BLOCK DIAGRAM



Vcc
Vin
Vcc 7
Vrel
8
36 V
Reference regulator
Vcc UVLO
R
Internal bias
2.5V
R1
R
3.6 V
Vref UVLO
Vc
7
Output
Q1
6
4
Oscillator
C1
1.0 mA
Power ground
5
S
Q
R
Voltage feedback input
2
Error amplifier
2R
10 V
R
PWM latch
Current sense Input
Output/ compensation
1
Current sense comparator
3
R5
Ground
5

KA3843B

24C08

8K 2.5V CMOS Serial EEPROMs

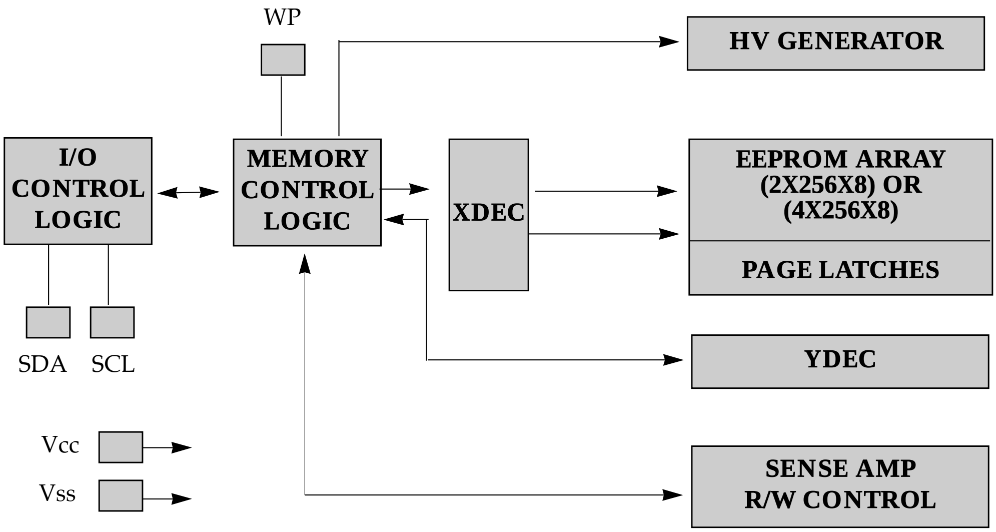
FEATURES

- Single supply with operation down to 2.5V
- Low power CMOS technology
  - 1 mA active current typical
  - 10uA standby current typical at 5.5V
  - 5uA standby current typical at 3.0V
- Organized as two or fore block of 256 bytes (2 X256X8) and (4X256X8)
- Two wire serial interface bus I²C™
- Schmitt tigger, filtered inputs for noise suppression
- Output slope control to eliminate ground bounce
- 100KHz(2.5V) and 400KHz(5V) compatibility
- Self-timed write cycle(including auto-erase)
- Page-write buffer for up to 16 bytes
- 2 ms typical wirte cycle time for page-write
- Hardware write cycle time for page-write
- Can be operated as a serial ROM
- Factory programmong (OPT) available
- ESD protection > 4.000V
- 1,000,000 ERASE/WRITE cycles(typical)
- Data retention > 40 years
- 8-pin DIP, 8-lead or 14-lead SOIC packages
- Available for extended temperature ranges
  - Commercial : 0 °C to +70 °C
  - Industrial : -40°C to +85 °C

DESCRIPTION

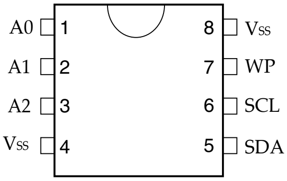
The Microchip Technology Inc. 24LC04B/08B is a 4K-or 8K-bit Electrically Erasable PROM
The device is organized as two or four blocks of 256 X 8 bit memory with a two wire serial interface.
Low voltage design permits operation down to 2.5 volts with standby and active currents of obly 5uA and 1mA respectively.
The 24LC048 / 08B also has a page-write capability for up to 16 bytes of data. The 24LC04B / 08B is available in the standard 8-pin DIP and both 8-lead and 14-lead surface mount SOIC packages.

BLOCK DIAGRAM


WP
HV GENERATOR
I/O CONTROL LOGIC
MEMORY CONTROL LOGIC
XDEC
EEPROM ARRAY (2X256X8) OR (4X256X8)
PAGE LATCHES
SDA
SCL
YDEC
Vcc
Vss
SENSE AMP R/W CONTROL

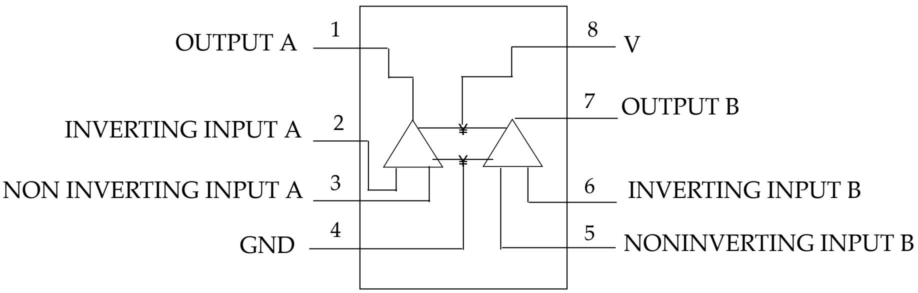
PIN CONFIGURATION

DIP Package

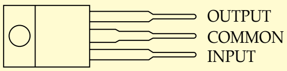
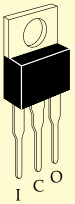

A0
A1
A2
VSS
1
2
3
4
8
7
6
5
VSS
WP
SCL
SDA

PC is a trademark of philips Corporation

LM358


OUTPUT A
1
INVERTING INPUT A
2
NON INVERTING INPUT A
3
GND
4
8
V
7
OUTPUT B
6
INVERTING INPUT B
5
NONINVERTING INPUT B

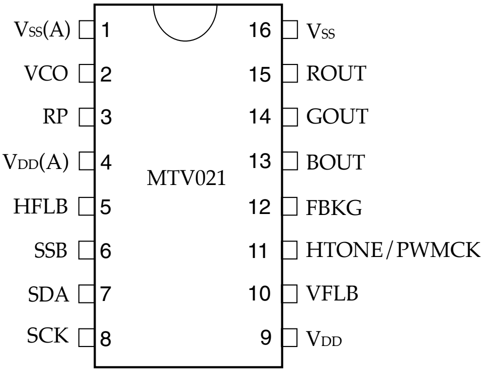
Voltage Regulator ICs

Type No	Function	Typ Vo(V)	Max			Package
			Io(A)	Vin(V)	P_D(W)	
KIA7805P/PI	1.0A 3-Terminal Regulator	5	1.0	35	20.8	 OUTPUT COMMON INPUT TO-220AB
KIA7806P/PI		6				
KIA7808P/PI		8				
KIA7809P/PI		9				
KIA7810P/PI		10				
KIA7812P/PI		12				
KIA7815P/PI		15				
KIA7818P/PI		18		40		
KIA7820P/PI		20				
KIA7824P/PI		24				

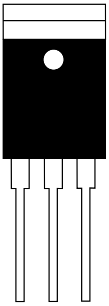
MTV021

FEATURES

- Horizontal SYNC input up to 130KHz.
- On-chip PLL circuitry up to 96 MHz.
- Programmable horizontal resolutions up to 1524 dots per display row.
- Full-screen display consists of 15(rows)by 30(columns) characters.
- 12 X 18 dot matrices per character.
- Total of 272 characters and graphic fonts, inclding 256 standard and 16 multi-color mask ROM Fonts.
- 8 color-selectable maximum per display chardcter.
- 7 colcr-selectable maximum for character background.
- Double character height and/or width control.
- Programmable positioning for display screen center.
- Row to row spacing register to manipulate the constant display height.
- 4 Programmable backgound windows with multi-level operation and shadowing on window effect.
- Software clears bit for full-screen erasing.
- Half tone and fast blanking output.
- Fade-in/fade-out effect.
- 8-channel/8-bit PWM D/A converter output.
- Compatible with SPI bus or I2C interface with slave address 7AH(slave address is mask option).
- 16-pin. 20-pin or 24-pin PDIP package.



Power Transistor



2SC5411

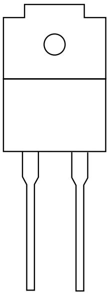
RATING	SYMBOL	2SC5411	UNIT
Base Breakdown Voltage	V_{CBO}	1500	Vdc
Emitter Sustaining Voltage	$V_{CEO(SUS)}$	600	Vdc
Current-Continuous -Pulsed(1)	I_C I_{CP}	14 28	Adc
Current-Continuous	I_B	7	Adc

FNQG1FS

QUICK REFERENCE DATA

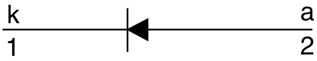
SYMBOL	PARAMETER	MAX.	UNIT
V_{RRM}	Repetitive peak reverse voltage	1500	V
V_F	Forward voltage	1.35	V
$I_{F(AV)}$	Average forward current	10	A
I_{FSM}	Non-repetitive peak forward current	75	A
t_{rr}	Reverse recovery time	0.25	μs

PIN CONFIGURATION



Case

SYMBOL

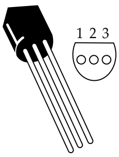


TRANSISTORS

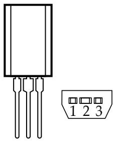
Type No.	MAX. RATINGS			$V_{CE(SET)}$		Max	No			Package
	V_{CEO} (V)	I_C (mA)	P_C (mW)	(V)	I_C (mA)	I_B (mA)	1	2	3	
KSP45	350	300	1.5W	0.5	10	1	E	B	C	TO-92
KSA928AY	-30	-2A	1W	-2.0	-1.5A	-30	E	C	B	TO-92
KTA200Y	-50	-500	625	-0.25	-100	-10-30	E	C	B	TO-92
KSA1013AY	-160	-1A	900	-1.5	-500	-50	E	C	B	TO-92
KSA2328AY	30	2A	1W	2.0	1.5A	3.0	E	C	B	TO-92
KRC102M	50	100	400	-0.3	-100	-0.88	E	C	B	TO-92
KTA1266	-50	-150	625	-0.3	-100	-10	E	C	B	TO-92
KTC3200	120	100	625	0.3	10	1	E	C	B	TO-92
KTC3228Y	160	1A	1W	1.5	500	50	E	B	C	TO-92
KSC5042F	900	100	6W	5	20	4	E	C	B	TO-220
BD135	45	2A	8W	0.5	500	50	E	C	B	TO-92
2N5770	15	50	350	0.4	10	1.0	E	B	C	TO-126
KSP92	-300	-500	625	-0.5		-0.25	E	B	C	TO-92
KSP42	300	500	625	-0.5	20	2	E	B	C	(5011)
R1002	-50	100	400	-0.3	-100	-0.88	E	C	B	TO-92M
KSC945CY	50	150	250	0.15	100	10	E	B	C	TO-92
KTA1275Y	-160	-1.0A	1W	-1.5	-500	-50	E	C	B	TO-92L
KTA1268BL	-120	-100	400	-0.3	-10	-1	E	C	B	TO-92
KSA733	-50	-150	250	-0.18	-100	-10	E	B	C	TO-92
KTC3198Y	50	150	625	0.25	100	10	E	C	B	TO-92

FET	VDSS (V)	IDSS	PD	RDSS(ohm)	VGS	1	2	3	PACKAGE
2N7000	60	200mA	400mW	5	±40V	S	G	D	TO-92
FQPF9N50	500	5.3A	50W	0.58	5.0	G	D	S	TO-220
IRF630A	200	9A	72W	0.4	4.0	G	D	S	TO-220
IRFS630A	200	6.5A	38W	0.4	4.0	G	D	S	TO-220
2SK2761	900V (V_{DSS})	10A (I_D)	40W (P_T)	2.1 Ω $R_{DS}(On)$	± 30V (V_{GSS})	G	D	S	TO-220IS
IRF630	200V (V_{DSS})	9A (I_D)	75W (P_T)	0.4 Ω (MAX) $R_{DS}(On)$	±20V (V_{GSS})	G	D	S	TO-220AB
IRF640	200V (V_{DSS})	18A (I_D)	139W (P_T)	0.18 Ω $R_{DS}(On)$	±30V (V_{GSS})	G	D	S	TO-220AB
2SK2847	900 (V_{DS})	24A (I_{DP})	85W	1.1 Ω RDS(On)	± 30 (V_{GS})	G	D	S	TO-3P
IRF9630	-200V (V_{DSS})	-6.5A (I_D)	75W (P_D)	0.8 Ω $R_{DS}(ON)$	±20V (V_{GS})	G	D	S	TO-220

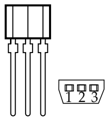
TO-92



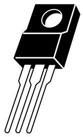
TO-92L



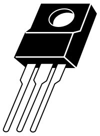
TO-92M



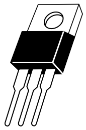
TO-220IS



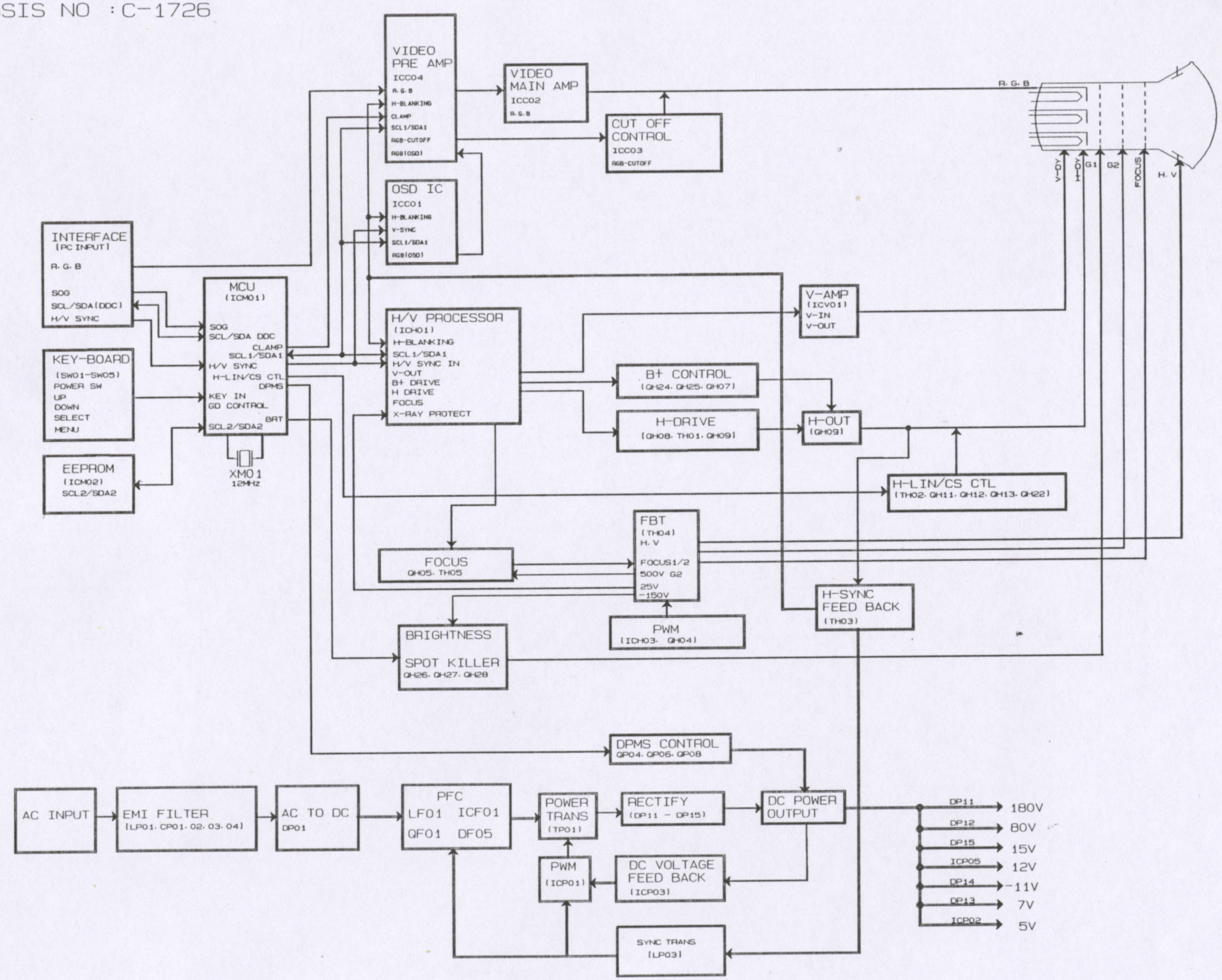
TO-3P



TO-220AB



MODEL : Q790
TYPE NO : C17F15090
CHASSIS NO : C-1726


VIDEO PRE AMP
ICC04
R.G.B
H-BLANKING
CLAMP
SCL1/SDA1
RGB-CUTOFF
RGB(OSD)
VIDEO MAIN AMP
ICC02
R.G.B
CUT OFF CONTROL
ICC03
RGB-CUTOFF
R.G.B
V-DY
H-DY
G1
G2
FOCUS
H.V
OSD IC
ICC01
H-BLANKING
V-SYNC
SCL1/SDA1
RGB(OSD)
INTERFACE
(PC INPUT)
R.G.B
SOG
SCL/SDA(DDC)
H/V SYNC
MCU
(ICM01)
SOG
SCL/SDA DDC
CLAMP
SCL1/SDA1
H/V SYNC
H-LIN/CS CTL
DPMS
KEY IN
GD CONTROL
BRT
SCL2/SDA2
XM01
12MHz
KEY-BOARD
(SW01-SW05)
POWER SW
UP
DOWN
SELECT
MENU
EEPROM
(ICM02)
SCL2/SDA2
H/V PROCESSOR
(ICH01)
H-BLANKING
SCL1/SDA1
H/V SYNC IN
V-OUT
B+ DRIVE
H DRIVE
FOCUS
X-RAY PROTECT
V-AMP
(ICV01)
V-IN
V-OUT
B+ CONTROL
(QH24, QH25, QH07)
H-DRIVE
(QH08, TH01, QH09)
H-OUT
(QH09)
H-LIN/CS CTL
(TH02, QH11, QH12, QH13, QH22)
FBT
(TH04)
H.V
FOCUS1/2
500V G2
25V
-150V
FOCUS
QH05, TH05
H-SYNC FEED BACK
(TH03)
PWM
(ICH03, QH04)
BRIGHTNESS
SPOT KILLER
QH26, QH27, QH28
DPMS CONTROL
QP04, QP06, QP08
AC INPUT
EMI FILTER
(LP01, CP01, 02, 03, 04)
AC TO DC
DP01
PFC
LF01 ICF01
QF01 DF05
POWER TRANS
(TP01)
RECTIFY
(DP11 - DP15)
DC POWER OUTPUT
PWM
(ICP01)
DC VOLTAGE FEED BACK
(ICP03)
SYNC TRANS
(LP03)
DP11 180V
DP12 80V
DP15 15V
ICP05 12V
DP14 -11V
DP13 7V
ICP02 5V

WARNING: THIS EQUIPMENT CONTAINS SAFETY & CDRH CRITICAL COMPONENTS
ALL PARTS SHOWN IN THE ⚠ MARKS OF THE SCHEMATIC ARE SAFETY
REPLACE SAFETY CHITICAL COMPONENTS ONLY WITH MANUFACTURERS
RECOMMENED PARTS LIST FOR EXACT REPLACEMENTS.

NOTE:
1. RESISTANCE IS SHOWN IN OHM K=1,000 M=1,000,000 RATED POWER OF RESISTOR NOT NOTED IN SCHEMATIC DIAGRAM IS 1/8W R-CARBON.
2. CAPACITANCE IS SHOWN pF AND NOTED CAPACITANCES IS SHOWN uF. uF=1,000,000pF RATED VOLTAGE OF CONDENCER NOT NOTED IN SCHEMATIC DIAGRAM IS 50V.
3. ABBREVIATION AND SYMBOL
P: POLYESTER PP: POLYPROPYLENE
4. THIS SCHEMATIC DIAGRAM IS SUBJECTED TO CHANGE WITHOUT NOTICE FOR FURTHER IMPROVEMENT.

DWG. REV.	A	DESCRIPTION		DOC. NO.	DATE	APPROVAL
DWG. NO.			SIGNATURE	DATE	INSP	SHEET NO.
TITLE Q790		DWN	D. Y. KIM	02. 03. 21		1/1
		CHK	B. H. KIM	02. 03. 21		
ImageQuest		APP	Y. K. BYUN	02. 03. 21		

MAIN BOARD

NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
1		E420453191C	AC INLET ASSY,Q770	⚠
2		3720101773	CONN-M,AC INLET SOLDER	
3		E4208521001	PCBA MA(I1*),Q790 EXP	
4		E4208821001	PCBA MA(I2*),Q790 EXP	
5		E4208921001	PCBA MA(I3*),Q790 EXP	
6		E4208421061	PCBA MA(A6*),Q790 EXP	
7		E4208421051	PCBA MA(A5*),Q790 EXP	
8		E4208421041	PCBA MA(A4*),Q790 EXP	
9		3040100892	PCB-SINGLE,Q790 MAIN+CRT+	
10	CM01	2131040020	CAP-MULT,0.1UF 50V Z AXI	
11	CM04	2131040020	CAP-MULT,0.1UF 50V Z AXI	
12	CM05	2132200002	CAP-MULT,22PF 50V J AXI	
13	CM06	2132200002	CAP-MULT,22PF 50V J AXI	
14	CM08	2131040020	CAP-MULT,0.1UF 50V Z AXI	
15	CM12	2131040020	CAP-MULT,0.1UF 50V Z AXI	
16	CM14	2131040020	CAP-MULT,0.1UF 50V Z AXI	
17	CM15	2131040020	CAP-MULT,0.1UF 50V Z AXI	
18	DH01	DT1N4148	DIODE,1N4148 TAPING	
19	DH02	DT1N4148	DIODE,1N4148 TAPING	
20	DH03	DT1N4148	DIODE,1N4148 TAPING	
21	DH05	DTUF4007	DIODE,UF4007	
22	DH07	DT1N4148	DIODE,1N4148 TAPING	
23	DH09	DT1N4937	DIODE,1N4937 TAPING	
24	DH12	DT1N4148	DIODE,1N4148 TAPING	
25	DH13	DT1N4148	DIODE,1N4148 TAPING	
26	DH14	DT1N4148	DIODE,1N4148 TAPING	
27	DH15	DTUF4007	DIODE,UF4007	
28	DH21	DT1N4937	DIODE,1N4937 TAPING	
29	DH22	DT1N4148	DIODE,1N4148 TAPING	
30	DH25	DT1N4148	DIODE,1N4148 TAPING	
31	DH28	DT1N4937	DIODE,1N4937 TAPING	
32	DH30	DT1N4148	DIODE,1N4148 TAPING	
33	DH36	DT1N4148	DIODE,1N4148 TAPING	
34	DH38	DT1N4007	DIODE,1000V 1.0A TAP	
35	DH39	DT1N4148	DIODE,1N4148 TAPING	
36	DH40	DT1N4148	DIODE,1N4148 TAPING	
37	DH41	DT1N4007	DIODE,1000V 1.0A TAP	
38	DP06	DT1N4148	DIODE,1N4148 TAPING	
39	DP08	DT1N4148	DIODE,1N4148 TAPING	
40	DP09	DT1N4148	DIODE,1N4148 TAPING	
41	DP14	DTUF4004	DIODE,UF4004	
42	DP16	DTUF4004	DIODE,UF4004	
43	DP17	DT1N4937	DIODE,1N4937 TAPING	

NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
44	DP18	DT1N4937	DIODE,1N4937 TAPING	
45	DP20	DTISS81	DIODE,SWITCHING ISS81	
46	DP30	DT1N4148	DIODE,1N4148 TAPING	
47	DV01	DTUF4002	DIODE,UF4002	
48	JP01	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
49	JP02	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
50	JP03	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
51	JP04	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
52	JP05	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
53	JP06	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
54	JP07	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
55	JP08	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
56	JP09	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
57	JP10	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
58	JP11	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
59	JP12	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
60	JP13	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
61	JP14	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
62	JP15	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
63	JP16	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
64	JP18	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
65	JP19	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
66	JP20	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
67	JP21	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
68	JP22	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
69	JP23	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
70	JP24	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
71	JP25	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
72	JP26	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
73	JP27	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
74	JP28	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
75	JP29	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
76	JP30	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
77	JP31	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
78	JP32	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
79	JP33	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
80	JP34	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
81	JP35	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
82	JP36	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
83	JP37	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
84	JP38	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
85	JP39	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
86	JP40	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
87	JP41	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
88	JP42	375300002401	WIRE-NS-S43MM TAP. SDA 1/	

NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
89	JP43	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
90	JP44	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
91	JP45	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
92	JP46	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
93	JP47	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
94	JP48	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
95	JP49	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
96	JP50	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
97	JP51	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
98	JP52	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
99	JP53	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
100	JP54	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
101	JP55	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
102	JP56	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
103	JP57	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
104	JP58	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
105	JP59	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
106	JP60	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
107	JP61	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
108	JP62	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
109	JP63	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
110	JP64	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
111	JP65	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
112	JP66	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
113	JP67	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
114	JP68	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
115	JP69	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
116	JP70	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
117	JP71	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
118	JP72	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
119	JP73	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
120	JP74	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
121	JP75	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
122	JP76	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
123	JP77	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
124	JP78	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
125	JP79	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
126	JP80	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
127	JP81	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
128	JP82	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
129	JP83	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
130	JP84	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
131	JP85	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
132	JP86	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
133	JP87	375300002401	WIRE-NS-S43MM TAP. SDA 1/	

NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
134	JP89	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
135	JP90	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
136	JP91	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
137	JP92	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
138	LH02	3500100493	INDUCT-FIX,AL04TB101K K A	
139	LH03	3500101335	PEAKING,AL03TB220K K A	
140	LH04	3500101335	PEAKING,AL03TB220K K A	
141	RF01	RD-4P0T0101J	RES-CF,RD 1/4W 100 OHM J	
142	RF02	RD-8P0T0100J	RES-CF,RD 1/8W 10 OHM J	
143	RF03	RD-8P0T0103J	RES-CF,RD 1/8W 10KOHM J	
144	RF04	2402004002	RES-CF,2M 0.5W J M	
145	RF05	RD-4P0T0223J	RES-CF,RD 1/4W 22K OHM J	
146	RF06	RD-4P0T0153J	RES-CF,RD 1/4W 15K OHM J	
147	RF08	RD-8P0T0223J	RES-CF,RD 1/8W 22K OHM J	
148	RH01	RD-8P0T0472J	RES-CF,RD 1/8W 4.7K OHM J	
149	RH02	RD-8P0T0331J	RES-CF,RD 1/8W 330 OHM J	
150	RH03	RD-8P0T0331J	RES-CF,RD 1/8W 330 OHM J	
151	RH04	RD-8P0T0682J	RES-CF,RD 1/8W 6.8K OHM J	
152	RH05	RD-8P0T0223J	RES-CF,RD 1/8W 22K OHM J	
153	RH06	RD-8P0T0332J	RES-CF,RD 1/8W 3.3K OHM J	
154	RH07	2446800003	RES-MF,680 0.125W F A	
155	RH08	RN-8P0T2701F	RES-MF,RN 1/8W 2.7KOHM F	
156	RH09	RD-8P0T0102J	RES-CF,RD 1/8W 1K OHM J	
157	RH10	RD-8P0T0392J	RES-CF,RD 1/8W 3.9K OHM J	
158	RH100	RD-8P0T0105J	RES-CF,RD 1/8W 1M OHM J	
159	RH101	RD-4P0T0474J	RES-CF,RD 1/4W 470K OHM J	
160	RH102	240100200901	RES-CF,10K 0.5W J M	
161	RH103	2461201005	RES-MOF,1.2K 1W J M	
162	RH104	RD-8P0T0394J	RES-CF,RD 1/8W 390K OHM J	
163	RH105	2401804003	RES-CF,1.8M 0.125W J A	
164	RH106	2401804003	RES-CF,1.8M 0.125W J A	
165	RH107	2401804003	RES-CF,1.8M 0.125W J A	
166	RH108	2404701010	RES-CF,4.7K 0.5W J M	
167	RH109	RD-4P0T0152J	RES-CF,RD 1/4W 1.5K OHM J	
168	RH11	RN-8P0T4302F	RES-MF,RN 1/8W 43KOHM F	⚠
169	RH110	RD-8P0T0272J	RES-CF,RD 1/8W 2.7K OHM J	
170	RH111	RD-8P0T0472J	RES-CF,RD 1/8W 4.7K OHM J	
171	RH112	RD-8P0T0753J	RES-CF,RD 1/8W 75K OHM J	
172	RH113	2442303001	RES-MF,230K 0.125W F A	⚠
173	RH12	RN-8P0T4302F	RES-MF,RN 1/8W 43KOHM F	⚠
174	RH13	RN-8P0T2402F	RES-MF,RN 1/8W 24K OHM F	⚠
175	RH14	RN-8P0T5601F	RES-MF,RN 1/8W 5.6KOHM F	
176	RH15	2441912002	RES-MF,19.1K 0.125W F A	
177	RH16	RD-4P0T0102J	RES-CF,RD 1/4W 1K OHM J	
178	RH17	2404700007	RES-CF,470 0.5W J M	

NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
179	RH18	RD-8P0T0104J	RES-CF,RD 1/8W 100K OHM J	
180	RH19	RD-8P0T0101J	RES-CF,RD 1/8W 100 OHM J	
181	RH20	RD-8P0T0101J	RES-CF,RD 1/8W 100 OHM J	
182	RH21	RD-8P0T0101J	RES-CF,RD 1/8W 100 OHM J	
183	RH22	RD-8P0T0101J	RES-CF,RD 1/8W 100 OHM J	
184	RH23	2464708004	RES-MOF,4.7 1W J M	
185	RH24	RD-8P0T0273J	RES-CF,RD 1/8W 27K OHM J	
186	RH25	RD-8P0T0103J	RES-CF,RD 1/8W 10KOHM J	
187	RH26	RD-8P0T0473J	RES-CF,RD 1/8W 47K OHM J	
188	RH27	RD-8P0T0333J	RES-CF,RD 1/8W 33K OHM J	
189	RH28	RD-8P0T0330J	RES-CF,RD 1/8W 33 OHM J	
190	RH29	RD-8P0T0472J	RES-CF,RD 1/8W 4.7K OHM J	
191	RH30	RD-8P0T0103J	RES-CF,RD 1/8W 10KOHM J	
192	RH33	254100800301	RES-FUS,1 1W J M	
193	RH36	RN-8P0T3602F	RES-MF,RN 1/8W 36K OHM F	
194	RH38	RD-8P0T0223J	RES-CF,RD 1/8W 22K OHM J	
195	RH39	RD-8P0T0101J	RES-CF,RD 1/8W 100 OHM J	
196	RH40	RD-8P0T0101J	RES-CF,RD 1/8W 100 OHM J	
197	RH41	RD-8P0T0330J	RES-CF,RD 1/8W 33 OHM J	
198	RH42	RD-8P0T0330J	RES-CF,RD 1/8W 33 OHM J	
199	RH43	RD-8P0T0222J	RES-CF,RD 1/8W 2.2K OHM J	
200	RH44	RD-8P0T0222J	RES-CF,RD 1/8W 2.2K OHM J	
201	RH45	RD-8P0T0221J	RES-CF,RD 1/8W 220 OHM J	
202	RH47	RD-8P0T0103J	RES-CF,RD 1/8W 10KOHM J	
203	RH48	RD-4P0T0121J	RES-CF,RD 1/4W 120 OHM J	
204	RH50	RD-8P0T0103J	RES-CF,RD 1/8W 10KOHM J	⚠
205	RH51	2404708006	RES-CF,4.7 0.5W J M	
206	RH52	RD-8P0T0103J	RES-CF,RD 1/8W 10KOHM J	⚠
207	RH53	RD-8P0T0103J	RES-CF,RD 1/8W 10KOHM J	
208	RH55	RN-4P0T1201F	RES-MF,RN 1/4W 1.2KOHM F	
209	RH56	2461500004	RES-MOF,150 2W J M	
210	RH57	RD-8P0T0821J	RES-CF,RD 1/8W 820 OHM J	
211	RH58	RD-8P0T0331J	RES-CF,RD 1/8W 330 OHM J	
212	RH59	RD-8P0T0472J	RES-CF,RD 1/8W 4.7K OHM J	
213	RH60	RD-8P0T0472J	RES-CF,RD 1/8W 4.7K OHM J	
214	RH61	RD-8P0T0472J	RES-CF,RD 1/8W 4.7K OHM J	
215	RH62	RD-8P0T0472J	RES-CF,RD 1/8W 4.7K OHM J	
216	RH63	RD-8P0T0472J	RES-CF,RD 1/8W 4.7K OHM J	
217	RH64	RD-8P0T0472J	RES-CF,RD 1/8W 4.7K OHM J	
218	RH65	RD-8P0T0472J	RES-CF,RD 1/8W 4.7K OHM J	
219	RH66	RD-8P0T0472J	RES-CF,RD 1/8W 4.7K OHM J	
220	RH67	RD-8P0T0104J	RES-CF,RD 1/8W 100K OHM J	
221	RH68	2407503004	RES-CF,750K 0.125W J A	
222	RH69	RD-8P0T0153J	RES-CF,RD 1/8W 15K OHM J	
223	RH71	RD-8P0T0103J	RES-CF,RD 1/8W 10KOHM J	

NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
224	RH72	RD-8P0T0751J	RES-CF,RD 1/8W 750 OHM J	
225	RH73	RD-8P0T0103J	RES-CF,RD 1/8W 10KOHM J	
226	RH74	RD-8P0T0105J	RES-CF,RD 1/8W 1M OHM J	
227	RH76	2462003001	RES-MOF,200K 1W J M	
228	RH77	RD-4P0T0101J	RES-CF,RD 1/4W 100 OHM J	
229	RH78	RD-4P0T0101J	RES-CF,RD 1/4W 100 OHM J	
230	RH79	RD-4P0T0222J	RES-CF,RD 1/4W 2.2K OHM J	
231	RH80	RD-8P0T0683J	RES-CF,RD 1/8W 68K OHM J	
232	RH81	RD-8P0T0103J	RES-CF,RD 1/8W 10KOHM J	
233	RH82	RD-8P0T0242J	RES-CF,RD 1/8W 2.4K OHM J	
234	RH83	RD-8P0T0222J	RES-CF,RD 1/8W 2.2K OHM J	
235	RH84	RD-8P0T0474J	RES-CF,RD 1/8W 470KOHM J	
236	RH85	RD-8P0T0471J	RES-CF,RD 1/8W 470 OHM J	
237	RH86	RD-8P0T0270J	RES-CF,RD 1/8W 27 OHM J	
238	RH87	RD-8P0T0472J	RES-CF,RD 1/8W 4.7K OHM J	
239	RH88	RD-8P0T0472J	RES-CF,RD 1/8W 4.7K OHM J	
240	RH89	2407503003	RES-CF,750K 0.5W J M	
241	RH90	RD-8P0T0183J	RES-CF,RD 1/8W 18K OHM J	
242	RH92	2464708006	RES-MOF,4.7 2W J M	
243	RH93	RD-4P0T0394J	RES-CF,RD 1/4W 390K OHM J	
244	RH94	RD-2P0T0274J	RES-CF,RD 1/2W 270K OHM J	
245	RH96	RD-4P0T0470J	RES-CF,RD 1/4W 47 OHM J	
246	RH97	RD-8P0T0274J	RES-CF,RD 1/8W 270K OHM J	
247	RH98	2464708006	RES-MOF,4.7 2W J M	
248	RH99	RD-8P0T0103J	RES-CF,RD 1/8W 10KOHM J	
249	RM01	RD-8P0T0472J	RES-CF,RD 1/8W 4.7K OHM J	
250	RM02	RD-8P0T0103J	RES-CF,RD 1/8W 10KOHM J	
251	RM04	RD-8P0T0105J	RES-CF,RD 1/8W 1M OHM J	
252	RM05	RD-8P0T0101J	RES-CF,RD 1/8W 100 OHM J	
253	RM06	RD-8P0T0101J	RES-CF,RD 1/8W 100 OHM J	
254	RM07	RD-8P0T0101J	RES-CF,RD 1/8W 100 OHM J	
255	RM08	RD-8P0T0101J	RES-CF,RD 1/8W 100 OHM J	
256	RM09	RD-8P0T0103J	RES-CF,RD 1/8W 10KOHM J	
257	RM10	RD-8P0T0101J	RES-CF,RD 1/8W 100 OHM J	
258	RM11	RD-8P0T0153J	RES-CF,RD 1/8W 15K OHM J	
259	RM12	RD-8P0T0153J	RES-CF,RD 1/8W 15K OHM J	
260	RM13	RD-8P0T0153J	RES-CF,RD 1/8W 15K OHM J	
261	RM14	RD-8P0T0913J	RES-CF,RD 1/8W 91K OHM J	
262	RM15	RD-8P0T0123J	RES-CF,RD 1/8W 12KOHM J	
263	RM16	RD-8P0T0101J	RES-CF,RD 1/8W 100 OHM J	
264	RM17	RD-8P0T0473J	RES-CF,RD 1/8W 47K OHM J	
265	RM18	RD-8P0T0472J	RES-CF,RD 1/8W 4.7K OHM J	
266	RM19	RD-8P0T0102J	RES-CF,RD 1/8W 1K OHM J	
267	RM20	RD-8P0T0153J	RES-CF,RD 1/8W 15K OHM J	
268	RM21	RD-8P0T0153J	RES-CF,RD 1/8W 15K OHM J	

NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
269	RM22	RD-8P0T0124J	RES-CF,RD 1/8W 120K OHM J	
270	RM23	RD-8P0T0752J	RES-CF,RD 1/8W 7.5K OHM J	
271	RM24	RN-4P0T1742F	RES-MF,RN 1/4W 17.4KOHM F	
272	RM25	RD-8P0T0103J	RES-CF,RD 1/8W 10KOHM J	
273	RM26	RD-8P0T0332J	RES-CF,RD 1/8W 3.3K OHM J	
274	RM27	RD-8P0T0332J	RES-CF,RD 1/8W 3.3K OHM J	
275	RM28	RD-4P0T0103J	RES-CF,RD 1/4W 10K OHM J	
276	RM29	RD-8P0T0472J	RES-CF,RD 1/8W 4.7K OHM J	
277	RM30	RD-8P0T0471J	RES-CF,RD 1/8W 470 OHM J	
278	RM32	2403309005	RES-CF,33 0.5W J M	
279	RM33	RD-8P0T0302J	RES-CF,RD 1/8W 3K OHM J	
280	RM34	RD-8P0T0103J	RES-CF,RD 1/8W 10KOHM J	
281	RM36	RD-8P0T0273J	RES-CF,RD 1/8W 27K OHM J	
282	RM37	RD-8P0T0103J	RES-CF,RD 1/8W 10KOHM J	
283	RM40	RD-8P0T0304J	RES-CF,RD 1/8W 300K OHM J	
284	RM41	RD-8P0T0472J	RES-CF,RD 1/8W 4.7K OHM J	
285	RM42	RD-8P0T0472J	RES-CF,RD 1/8W 4.7K OHM J	
286	RP01	2401004008	RES-CF,1M 0.5W J M	
287	RP02	2461003006	RES-MOF,100K 1W J M	
288	RP03	2460338002	RES-MOF,0.33 1W J M	
289	RP04	2464702005	RES-MOF,47K 2W J M	
290	RP05	RD-8P0T0472J	RES-CF,RD 1/8W 4.7K OHM J	
291	RP07	RD-4P0T0103J	RES-CF,RD 1/4W 10K OHM J	
292	RP08	RD-8P0T0151J	RES-CF,RD 1/8W 150 OHM J	
293	RP09	RD-8P0T0471J	RES-CF,RD 1/8W 470 OHM J	
294	RP10	2460338002	RES-MOF,0.33 1W J M	
295	RP11	RD-8P0T0472J	RES-CF,RD 1/8W 4.7K OHM J	
296	RP12	RD-4P0T02R2J	RES-CF,RD 1/4W 2.2 OHM J	
297	RP13	RD-8P0T0471J	RES-CF,RD 1/8W 470 OHM J	
298	RP14	RD-8P0T0470J	RES-CF,RD 1/8W 47 OHM J	
299	RP15	2406802007	RES-CF,68K 0.5W J M	
300	RP16	RD-4P0T0102J	RES-CF,RD 1/4W 1K OHM J	
301	RP17	RD-4P0T0330J	RES-CF,RD 1/4W 33 OHM J	
302	RP18	2401001010	RES-CF,1K 0.5W J M	
303	RP19	2404700007	RES-CF,470 0.5W J M	
304	RP21	2461003006	RES-MOF,100K 1W J M	
305	RP23	RD-8P0T0102J	RES-CF,RD 1/8W 1K OHM J	
306	RP24	RD-8P0T0392J	RES-CF,RD 1/8W 3.9K OHM J	
307	RP27	2406800008	RES-CF,680 0.5W J M	
308	RP28	2401001010	RES-CF,1K 0.5W J M	
309	RP29	2402208006	RES-CF,2.2 0.5W J M	
310	RP31	RD-8P0T0202J	RES-CF,RD 1/8W 2K OHM J	
311	RP32	RD-8P0T0204J	RES-CF,RD 1/8W 200K OHM J	
312	RP33	2442151002	RES-MF,2.15K 0.125W F A	
313	RP34	RD-4P0T0103J	RES-CF,RD 1/4W 10K OHM J	

NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
314	RP36	2441603002	RES-MF,160K 0.5W F A	
315	RP37	RD-4P0T0471J	RES-CF,RD 1/4W 470 OHM J	
316	RV01	RD-8P0T0682J	RES-CF,RD 1/8W 6.8K OHM J	
317	RV02	RD-8P0T0682J	RES-CF,RD 1/8W 6.8K OHM J	
318	RV05	2401208005	RES-CF,1.2 0.5W J M	
319	RV06	RD-8P0T0562J	RES-CF,RD 1/8W 5.6K OHM J	
320	RV07	2461308001	RES-MOF,1.3 1W J M	
321	RV08	RD-8P0T0562J	RES-CF,RD 1/8W 5.6K OHM J	
322	RV09	RD-8P0T0682J	RES-CF,RD 1/8W 6.8K OHM J	
323	RV10	RN-4P0T6801F	RES-MF,RN 1/4W 6.8KOHM F	
324	RV11	RD-4P0T0561J	RES-CF,RD 1/4W 560 OHM J	
325	ZDH08	DTUZ-12BSB	DIODE,ZENER UZ-12BSB TAP	
326	ZDH10	DTUZ-12BSB	DIODE,ZENER UZ-12BSB TAP	
327	ZDM01	DTUZ-5.1BSB	DIODE,ZENER UZ-5.1BSB TAP	
328	ZDM02	DTUZ-5.1BSB	DIODE,ZENER UZ-5.1BSB TAP	
329	ZDM03	DTUZ-5.1BSB	DIODE,ZENER UZ-5.1BSB TAP	
330	ZDM04	DTUZ-5.1BSB	DIODE,ZENER UZ-5.1BSB TAP	
331	ZDM05	DTUZ-5.1BSB	DIODE,ZENER UZ-5.1BSB TAP	
332	ZDP02	DTUZ-7.5BSB	DIODE,ZENER UZ-7.5BSB	
333	ZDP03	3101000387	DI-ZN,UZ-30BSB TAP LEAD	
334	ZDP07	DTUZ-13B	DIODE,ZENER UZ-13B	
335	CF02	CE04BT1C470M	CAP-EL,SMS 16V 47UF M	
336	CF03	CQ92BT2A102J	CAP-PE,100V 0.001UF J	
337	CF04	CF93BT1J224J	CAP-MPE,63V 0.22UF J	
338	CF05	CC45CT1H221J	CAP-CD,50V 220PF J NPO	
339	CF07	CK45BT3A101K	CAP-CD,1KV 100PF 10%	
340	CH01	CQ92BT2A154J	CAP-PE,100V 0.15UF J	
341	CH02	CQ92BT2A104J	CAP-PE,100V 0.1UF J	
342	CH03	CQ92BT2A822J	CAP-PE,100V 0.0082UF J	
343	CH04	CF93BT1J104J	CAP-MPE,63V 0.1UF J	
344	CH05	E42007019070	CAP-PP/PE,100V 0.01UF J	
345	CH06	E42007019050	CAP-PP/PE,100V 0.0047UF J	
346	CH07	CE04BT1C470M	CAP-EL,SMS 16V 47UF M	
347	CH08	CE04BT1H2R2M	CAP-EL,SMS 50V 2.2UF M	
348	CH09	CQ93PT2A152J	CAP-PP,100V 1500PF J TAP	
349	CH10	CQ92BT2A102J	CAP-PE,100V 0.001UF J	
350	CH11	CQ92BT2A272J	CAP-PE,100V 0.0027UF J	
351	CH12	2001010122	CAP-AL,100UF 100V M 10*20	
352	CH13	CK45BT1H101K	CAP-CD,50V 100PF K	
353	CH14	CE04BT1C101M	CAP-EL,SMS 16V 100UF M	
354	CH16	CQ92BT2A472J	CAP-PE,100V 0.0047UF J	
355	CH17	CK45BT1H101K	CAP-CD,50V 100PF K	
356	CH18	2171020022	CAP-P-F,1000PF 630V J RAD	
357	CH19	CE04BT1H100M	CAP-EL,SMS 50V 10UF M	
358	CH20	CQ92BT2A102J	CAP-PE,100V 0.001UF J	

NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
359	CH21	CF93BT1J474J	CAP-MPE,63V 0.47UF J	
360	CH22	2002200054	CAP-AL,22UF 200V M 10*20	
361	CH24	CE04BT1E470M	CAP-EL,SMS 25V 47UF M	
362	CH25	CQ92BT2A104J	CAP-PE,100V 0.1UF J	
363	CH28	CE04BT1H010M	CAP-EL,SMS 50V 1UF M	
364	CH30	CE04IT1H010M	CAP-EL,KME 50V 1UF M	
365	CH31	CK45BT3A221K	CAP-CD,1KV 220PF K TAP	
366	CH32	2143340011	CAP-MPP,0.33UF 250V J	
367	CH33	CE04IT1H010M	CAP-EL,KME 50V 1UF M	
368	CH35	2176810012	CAP-P-F,680PF 630V J RAD	
369	CH36	CE04BT1H470M	CAP-EL,SMS 50V 47UF M	
370	CH37	CQ92BT2A473J	CAP-PE,100V 0.047UF J	
371	CH38	CE04BT1C680M	CAP-EL,SMS 16V 68UF M	
372	CH40	CE04BT1C101M	CAP-EL,SMS 16V 100UF M	
373	CH41	2003390026	CAP-AL,3.3UF 50V M 5*11 N	
374	CH42	CF93BT1J104J	CAP-MPE,63V 0.1UF J	
375	CH43	CE04BT1H010M	CAP-EL,SMS 50V 1UF M	
376	CH44	CF93BT1J104J	CAP-MPE,63V 0.1UF J	
377	CH45	CK45BT1H681K	CAP-CD,50V 680PF K	
378	CH47	2002280014	CAP-AL,0.22UF 200V M 5*11	
379	CH51	2144730010	CAP-MPE,0.047UF 250V J	
380	CH54	CE04IT1H100M	CAP-EL,KME 50V 10UF M	
381	CH57	CE04BT1C331M	CAP-EL,SMS 16V 330UF M	
382	CH58	2004790055	CAP-AL,4.7UF 250V M 13*20	
383	CH61	2141040020	CAP-MPE,0.1UF 250V J RAD	
384	CH63	CK45BT1H331K	CAP-CD,50V 330PF K	
385	CH64	2178230004	CAP-PP,0.082UF 250V J RAD	
386	CH65	CE04IT1H010M	CAP-EL,KME 50V 1UF M	
387	CH67	CQ92BT2A473J	CAP-PE,100V 0.047UF J	
388	CH69	CE04BT1C470M	CAP-EL,SMS 16V 47UF M	
389	CH70	CK45BT3A101K	CAP-CD,1KV 100PF 10%	
390	CH72	CQ92BT2A472J	CAP-PE,100V 0.0047UF J	
391	CH73	CK45BT3A681K	CAP-CD,1KV 680PF K TAP	
392	CH74	2101510009	CAP-CER,150PF 2KV K Y5P	
393	CH75	2004790058	CAP-AL,4.7UF 400V M 10*20	
394	CM02	CE04BT1HR47M	CAP-EL,SMS 50V 0.47UF M	
395	CM07	CE04BT1HR22M	CAP-EL,SMS 50V 0.22UF M	
396	CM09	CQ92BT2A103J	CAP-PE,100V 0.01UF J	
397	CM10	CC45CT1H330J	CAP-CD,50V 33PF J	
398	CM11	E42007019220	CAP-PP/PE,100V 680PF J	
399	CM13	CE04IT1H470M	CAP-EL,KME 50V 47UF M	
400	CM18	CE04BT1H2R2M	CAP-EL,SMS 50V 2.2UF M	
401	CP02	E42007027070	CAP-CD,Y2 4700PF M TAP	
402	CP03	E42007027070	CAP-CD,Y2 4700PF M TAP	
403	CP06	2001010091	CAP-AL,100UF 25V M 6.3*11	

NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
404	CP08	CE04BT1E100M	CAP-EL,SMS 25V 10UF M	
405	CP09	CF93BT1J224J	CAP-MPE,63V 0.22UF J	
406	CP12	CE04BT1H470M	CAP-EL,SMS 50V 47UF M	
407	CP14	CK45BT1H102K	CAP-CD,50V 1000PF K	
408	CP15	2002210100	CAP-AL,220UF 16V M 6.3*11	
409	CP16	CE04BT1C100M	CAP-EL,SMS 16V 10UF M TAP	
410	CP17	2001010091	CAP-AL,100UF 25V M 6.3*11	
411	CP23	2001010122	CAP-AL,100UF 100V M 10*20	
412	CP24	2004710043	CAP-AL,470UF 16V M 10*12.	
413	CP25	2003310033	CAP-AL,330UF 25V M 10*13	
414	CP27	2006810009	CAP-AL,680UF 25V M 10*16	
415	CP28	2001010084	CAP-AL,100UF 16V M 6.3*11	
416	CP29	CE04BT1C101M	CAP-EL,SMS 16V 100UF M	
417	CP30	CQ92BT2A102J	CAP-PE,100V 0.001UF J	
418	CV01	CQ92BT2A472J	CAP-PE,100V 0.0047UF J	
419	CV02	2004710049	CAP-AL,470UF 25V M 10*16	
420	CV03	2002210091	CAP-AL,220UF 35V M 10*13	
421	CV04	CF93BT1J105J	CAP-MPE,63V 1UF J	
422	CV05	CE04BT1E471M	CAP-EL,SMS 25V 470UF M	
423	CV06	CQ92BT2A103J	CAP-PE,100V 0.01UF J	
424	CV07	CF93BT1J224J	CAP-MPE,63V 0.22UF J	
425	FP01	E42076013010	FUSE CLIP,TAPING	
426	ICP04	ULM431ACZT	ADJ SHUNT REG LM431 TAP	
427	LH01	3500101071	INDUCT-FIX,CHOKE 10UH DR0	
428	QH01	TTKSC945CY	TR,KSC945C-Y	
429	QH02	TTKTA200Y	TR,KTA200Y TAP	
430	QH03	TTKSC945CY	TR,KSC945C-Y	
431	QH05	TTKSP45	TR,KSP45	
432	QH08	TT2N7000	TR,2N7000	
433	QH10	TTKSC945CY	TR,KSC945C-Y	
434	QH14	TTKSC945CY	TR,KSC945C-Y	
435	QH15	TTKSC945CY	TR,KSC945C-Y	
436	QH16	TTKSC945CY	TR,KSC945C-Y	
437	QH19	TTKSC945CY	TR,KSC945C-Y	
438	QH20	TTKTA200Y	TR,KTA200Y TAP	
439	QH21	TTKSC945CY	TR,KSC945C-Y	
440	QH23	TTKTC200Y	TR,KTC200Y TAP	
441	QH24	TTKSC945CY	TR,KSC945C-Y	
442	QH25	TTKSA733CY	TR,KSA733C-Y	
443	QH26	TTKSC945CY	TR,KSC945C-Y	
444	QH27	3110100689	TR-GEN,KSA1013Y LEAD	
445	QH28	TTKSP45	TR,KSP45	
446	QM01	TTKTC200Y	TR,KTC200Y TAP	
447	QM02	TTKTA200Y	TR,KTA200Y TAP	
448	QM03	TTKSC945CY	TR,KSC945C-Y	

NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
449	QM04	TTKSC945CY	TR,KSC945C-Y	
450	QP01	3110100681	TR-GEN,KTC3228Y LEAD	
451	QP02	TTKSC945CY	TR,KSC945C-Y	
452	QP03	3110100705	TR-GEN,KRC105M LEAD	
453	QP04	TTKRC102M	TR,SWITCHING KRC102M	
454	QP05	3110100687	TR-GEN,KSA928AY LEAD	
455	QP06	TTKRC102M	TR,SWITCHING KRC102M	
456	QP07	3110100687	TR-GEN,KSA928AY LEAD	
457	QP08	TTKRC102M	TR,SWITCHING KRC102M	
458	RF09	246200900401	RES-MOF,20 2W J R-FORMING	
459	RH31	246100900701	RES-MOF,10 2W J R-FORMING	
460	RH32	246220800701	RES-MOF,2.2 1W J R-FORMIN	
461	RH54	246220900601	RES-MOF,22 2W J R-FORMING	
462	RH95	246330300401	RES-MOF,330K 1W J R-FORMI	
463	RP04	246470200501	RES-MOF,47K 2W J R-FORMIN	
464	RP26	246150800501	RES-MOF,1.5 2W J R-FORMIN	
465	RV03	246470800601	RES-MOF,4.7 2W J R-FORMIN	
466	RV04	254100800302	RES-FUS,1 1W J R-FORMING	
467	RV15	246470800601	RES-MOF,4.7 2W J R-FORMIN	
468	SG01	3411100043	VARISTOR,S23 1500V 1500V	
469	SW02	E42027039010	SWITCH TACT,5MM 160GF VER	
470	SW03	E42027039010	SWITCH TACT,5MM 160GF VER	
471	SW04	E42027039010	SWITCH TACT,5MM 160GF VER	
472	SW05	E42027039010	SWITCH TACT,5MM 160GF VER	
473	VRH01	3410300281	VR-S-FIX,RH0633C100 10K 0	⚠
474	XM01	3530200581	VIB-QUARTZ,12MHZ 22PF ATS	
475	CON03	372010105301	CONN-M,POST 1P DEGT235 14	
476	EL01	6130014200	EYELET,1.6PAI BRASS T=0.4	
477	EL02	6130014200	EYELET,1.6PAI BRASS T=0.4	
478	EL03	6130014200	EYELET,1.6PAI BRASS T=0.4	
479	EL04	6130014200	EYELET,1.6PAI BRASS T=0.4	
480	EL05	6130014200	EYELET,1.6PAI BRASS T=0.4	
481	EL06	6130014200	EYELET,1.6PAI BRASS T=0.4	
482	EL07	6130014200	EYELET,1.6PAI BRASS T=0.4	
483	EL08	6130014200	EYELET,1.6PAI BRASS T=0.4	
484	EL09	6130014200	EYELET,1.6PAI BRASS T=0.4	
485	EL10	6130014200	EYELET,1.6PAI BRASS T=0.4	
486	EL11	6130014100	EYELET,2.7PAI BRASS T=0.4	
487	EL12	6130014100	EYELET,2.7PAI BRASS T=0.4	
488	EL13	6130014100	EYELET,2.7PAI BRASS T=0.4	
489	EL14	6130014100	EYELET,2.7PAI BRASS T=0.4	
490	EL15	6130014100	EYELET,2.7PAI BRASS T=0.4	
491	EL16	6130014100	EYELET,2.7PAI BRASS T=0.4	
492	EL17	6130014200	EYELET,1.6PAI BRASS T=0.4	
493	EL18	6130014200	EYELET,1.6PAI BRASS T=0.4	

NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
494	EL19	6130014200	EYELET,1.6PAI BRASS T=0.4	
495	EL20	6130014200	EYELET,1.6PAI BRASS T=0.4	
496	EL21	6130014200	EYELET,1.6PAI BRASS T=0.4	
497	EL22	6130014200	EYELET,1.6PAI BRASS T=0.4	
498	EL23	6130014200	EYELET,1.6PAI BRASS T=0.4	
499	EL24	6130014200	EYELET,1.6PAI BRASS T=0.4	
500	EL25	6130014200	EYELET,1.6PAI BRASS T=0.4	
501	EL26	6130014200	EYELET,1.6PAI BRASS T=0.4	
502	EL27	6130014200	EYELET,1.6PAI BRASS T=0.4	
503	EL28	6130014200	EYELET,1.6PAI BRASS T=0.4	
504	EL29	6130014200	EYELET,1.6PAI BRASS T=0.4	
505	EL30	6130014200	EYELET,1.6PAI BRASS T=0.4	
506	EL31	6130014200	EYELET,1.6PAI BRASS T=0.4	
507	G2	372010105301	CONN-M,POST 1P DEGT235 14	
508	ICH02	ULM358N	IC,OP-AMP LM358N	
509	ICH03	UKA3843	IC,KA3843 DIP CONTROLLER	
510	ICM02	3203000819	IC-MEMO,S524A60X81	
511	WHV01	372010105301	CONN-M,POST 1P DEGT235 14	
512	DH11	M11143008012	SCREW,BIN(+) M3*8 MSZPC	
513	DH11	M31100030012	NUT HEX,6N1-3 MSZPC	
514	DH11	3102000242	DI-REC,FMQ-G1FS LEAD	
515	ICH01	6124035300	H-SINK IC,G910	
516	ICM01	6120048600	SHLD-PL,G910/P911 MCU COV	
517	ICP01	M11143008012	SCREW,BIN(+) M3*8 MSZPC	
518	ICP01	3200001258	IC-LIN,STRF6654A(LF1352)	
519	ICP05	M11143008012	SCREW,BIN(+) M3*8 MSZPC	
520	ICP05	ULM7812CT	IC,VOL REGULATOR,LM7812CT	
521	ICP05	6124020508	H-SINK POWER,B790 L=22MM	
522	ICV01	M11143008012	SCREW,BIN(+) M3*8 MSZPC	
523	ICV01	M31100030012	NUT HEX,6N1-3 MSZPC	
524	ICV01	3200001409	IC-LIN,KA2142A SIP	
525	ICV01	6124036700	H-SINK VERTICAL ASSY,V790	
526		6120043000	SOLDER GRIP,V770	
527		6124036300	H-SINK VERTICAL,V790	
528	QF01	M11143008012	SCREW,BIN(+) M3*8 MSZPC	
529	QF01	3114000183	FET,FQPF9N50 LEAD	
530	QF01	6124029212	H-SINK PWR FET A,V791	
531	QH04	B4212501006A	H/SINK PWR(N),ANODIZE 60M	
532	QH04	M11143008012	SCREW,BIN(+) M3*8 MSZPC	
533	QH04	3114000158	FET,2SK2761-01MR-F130-S07	
534	QH07	B4212501005A	HEAT SINK PWR(N)ANODIZE 4	
535	QH07	M11143008012	SCREW,BIN(+) M3*8 MSZPC	
536	QH07	3114000144	FET,IRF9630 LEAD	
537	QH09	M11143008012	SCREW,BIN(+) M3*8 MSZPC	
538	QH09	M31100030012	NUT HEX,6N1-3 MSZPC	

NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
539	QH09	3110100704	TR-GEN,2SC5411(AS) LEAD	
540	QH09	6120051000	SHLD-CASE,F/SHLD FBT ASY,	
541		6120043000	SOLDER GRIP,V770	
542		6120050000	SHLD-PL,FENCE SHIELD FBT	
543	QH11	M11143008012	SCREW,BIN(+) M3*8 MSZPC	
544	QH11	3114000080	FET,2SK2134-S12 LEAD	
545	QH11	6124032501	H-SINK CRT,Q770	
546	QH12	M11143008012	SCREW,BIN(+) M3*8 MSZPC	
547	QH12	311400017101	FET,IRFS630B LEAD	
548	QH13	M11143008012	SCREW,BIN(+) M3*8 MSZPC	
549	QH13	311400017101	FET,IRFS630B LEAD	
550	QH22	311400012401	FET,IRF630B/IRF630M	
551	CH23	217402000302	CAP-P-F,402J/2.5KV HIGH T	⚠
552	CH27	217154000901	CAP-PP,0.15UF 250V J TAP	
553	CH29	2148240004	CAP-MPP,0.82UF 250V J	
554	CH34	2141540005	CAP-MPP,0.15UF 250V J RAD	
555	CON01	3720101389	CONN-M,SMW200-07P	
556	CON04	3720101916	CONN-M,SMW200-14 14	
557	CON05	3720101227	CONN-M,5045-3A 3	
558	CON06	3720101385	CONN-M,SMW200-03P	
559	CON07	3720101387	CONN-M,SMW200-05P	
560	CP01	2144740024	X-CAP,0.47UF 250V M	
561	CP04	2144740024	X-CAP,0.47UF 250V M	
562	CP05	200680001201	CAP-AL,68UF 450V M 18*31.	
563	FP01	3628000036	CLP-FUSE,215 3.15 250V 3.	
564	ICF01	3200001502	IC-LIN,MC33260 DIP	
565	ICH01	3200001408	IC-LIN,TDA4841PS SDIP 32P	
566	ICM01	3205001382	IC-U,WT62P1-K42 DIP MTP	
567	ICM01A	3721100830	CONN-F,WSDIF-42T-1.778MM	
568	ICP02	ULM7805CT	IC,VOL REGULATOR,LM7805CT	
569	ICP03	3331100041	P-COUPLER,TLP621(D4,T)	
570	LF01	3510300192	TRAN-SW,PFC EE2821 Q790	
571	LP01	352020019201	FLT-LC,SQE2828 0.6P83T 30	
572	LP03	E42031090004A	TRANS SYNC,UU1116 TUBE	
573	PTC01	341130000901	POSISTOR,9OHM 2P CASE STI	
574	RLP01	3710100085	RELAY,DY3M-DC12V 5A 250V	
575	TH01	3510300170	TRAN-SW,HDT EI1916 B790+	
576	TH02	3500101865	INDUCT-FIX,Q790 LIN COIL	
577	TH03	3510300194	TRAN-SW,AFC EE2821 Q790	
578	TH05	3510300193	TRAN-SW,FOCUS EE2017 Q790	
579	TP01	3510200136	TRAN-PW,ER4042 Q790	⚠
580	AI01	3720101302	CONN-M,YW396-03V(2ND P DE	
581	AR01	2504701056	RES-NET,4.7K 0.125W J SIP	
582	CF06	2141050016	CAP-M-P,1UF 400V J PE	
583	CH76	2102230017	CAP-CER,0.022UF 1KV J Z4U	

NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
584	CH79	2143340010	CAP-M-P,0.33UF 400V J PE	
585	CP07	CK45BF2H103K	CAP-CD,500V 0.01UF K	
586	CP10	CE04BT1H101M	CAP-EL,SMS 50V 100UF M	
587	CP11	210472001501	CAP-CER,Y1 4700PF M NO-CU	⚠
588	CP21	2004700114	CAP-AL,47UF 200V M 12.5*2	
589	CP32	2102230017	CAP-CER,0.022UF 1KV J Z4U	
590	DF05	3100500184	DI-SW,RG4A LF-L1 LEAD	
591	DH04	3100500184	DI-SW,RG4A LF-L1 LEAD	
592	DH06	3100500163	DI-SW,RG4 LF-L1(015-206)	
593	DH32	3104100134	DI-SCHOT,SB350L-57 LEAD	
594	DP01	3102000246	DI-BRI,GSIB460L LEAD	
595	DP11	3100500149	DI-SW,RG4C LF-K2(015-202)	
596	DP12	3100500087	DI-SW,S2L60-4004P15 LEAD	
597	DP13	3100500163	DI-SW,RG4 LF-L1(015-206)	
598	DP15	3100500163	DI-SW,RG4 LF-L1(015-206)	
599	LED01	3330600441	LED,A1329B/GYC/R2	
600	NTC01	E42077O8409A	THERMISTOR 180HM 13PAI TA	
601	NTC01A	E42043055050	CONN,POST 2P 7.5MM	
602	RF07	2460228005	RES-MOF,0.22 3W J V	
603	RH35	2561000007	RES-CEM,100 7W J U	
604	RH49	2463909007	RES-MOF,39 3W J M	
605	RH75	2463909007	RES-MOF,39 3W J M	
606	SW01	3700800117	SW-PUSH,CPS-1202 30V 0.3A	
607	TH04	3510500096	FBT,Q790	⚠

CRT BOARD

NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
1		E4208621002	PCBA CRT(T1*),Q790	
2		E4208521002	PCBA CRT(I1*),Q790	
3		E4208921002	PCBA CRT(I3*),Q790	
4		E4208421062	PCBA CRT(A6*),Q790	
5		E4208421052	PCBA CRT(A5*),Q790	
6		E4208421042	PCBA CRT(A4*),Q790	
7	BC02	3540200058	BD-FER,BFS3550	
8	BC03	3540200058	BD-FER,BFS3550	
9	BC04	3540200058	BD-FER,BFS3550	
10	CC01	2131040020	CAP-MULT,0.1UF 50V Z AXI	
11	CC02	2131040020	CAP-MULT,0.1UF 50V Z AXI	
12	CC03	2131040020	CAP-MULT,0.1UF 50V Z AXI	
13	CC06	2131040020	CAP-MULT,0.1UF 50V Z AXI	
14	CC10	2131040020	CAP-MULT,0.1UF 50V Z AXI	
15	CC27	2131040020	CAP-MULT,0.1UF 50V Z AXI	
16	CC32	2131040020	CAP-MULT,0.1UF 50V Z AXI	
17	CC34	2131040020	CAP-MULT,0.1UF 50V Z AXI	
18	CC40	2131040020	CAP-MULT,0.1UF 50V Z AXI	
19	DC01	DT1N4148	DIODE,1N4148 TAPING	
20	DC02	DT1N4148	DIODE,1N4148 TAPING	
21	DC03	DT1N4148	DIODE,1N4148 TAPING	
22	DC04	DT1N4148	DIODE,1N4148 TAPING	
23	DC05	DT1N4148	DIODE,1N4148 TAPING	
24	DC06	DT1N4148	DIODE,1N4148 TAPING	
25	DC07	DTISS81	DIODE,SWITCHING ISS81	
26	DC08	DTISS81	DIODE,SWITCHING ISS81	
27	DC09	DTISS81	DIODE,SWITCHING ISS81	
28	DC10	DTISS81	DIODE,SWITCHING ISS81	
29	DC11	DTISS81	DIODE,SWITCHING ISS81	
30	DC12	DTISS81	DIODE,SWITCHING ISS81	
31	DC13	DTISS81	DIODE,SWITCHING ISS81	
32	DC14	DTISS81	DIODE,SWITCHING ISS81	
33	DC15	DTISS81	DIODE,SWITCHING ISS81	
34	JC01	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
35	JC02	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
36	JC03	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
37	JC04	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
38	JC05	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
39	JC06	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
40	LC01	RD-8P0T0330J	RES-CF,RD 1/8W 33 OHM J	

NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
41	LC02	RD-8P0T0330J	RES-CF,RD 1/8W 33 OHM J	
42	LC03	RD-8P0T0330J	RES-CF,RD 1/8W 33 OHM J	
43	LC04	3500101356	PEAKING,AL03TBR12K K A	
44	LC05	3500101356	PEAKING,AL03TBR12K K A	
45	LC06	3500101356	PEAKING,AL03TBR12K K A	
46	LC07	3500101335	PEAKING,AL03TB220K K A	
47	RC01	RD-8P0T0750J	RES-CF,RD 1/8W 75 OHM J	
48	RC02	RD-8P0T0750J	RES-CF,RD 1/8W 75 OHM J	
49	RC03	RD-8P0T0750J	RES-CF,RD 1/8W 75 OHM J	
50	RC04	RD-8P0T0330J	RES-CF,RD 1/8W 33 OHM J	
51	RC05	RD-8P0T0330J	RES-CF,RD 1/8W 33 OHM J	
52	RC06	RD-8P0T0330J	RES-CF,RD 1/8W 33 OHM J	
53	RC07	RD-8P0T0331J	RES-CF,RD 1/8W 330 OHM J	
54	RC08	RD-8P0T0331J	RES-CF,RD 1/8W 330 OHM J	
55	RC09	RD-8P0T0331J	RES-CF,RD 1/8W 330 OHM J	
56	RC10	RD-8P0T0331J	RES-CF,RD 1/8W 330 OHM J	
57	RC11	RD-8P0T0273J	RES-CF,RD 1/8W 27K OHM J	
58	RC12	RD-8P0T0472J	RES-CF,RD 1/8W 4.7K OHM J	
59	RC13	RD-8P0T0103J	RES-CF,RD 1/8W 10KOHM J	
60	RC14	RD-8P0T0103J	RES-CF,RD 1/8W 10KOHM J	
61	RC16	RD-8P0T0102J	RES-CF,RD 1/8W 1K OHM J	
62	RC17	2464708004	RES-MOF,4.7 1W J M	
63	RC18	RD-8P0T0102J	RES-CF,RD 1/8W 1K OHM J	
64	RC19	RD-8P0T0474J	RES-CF,RD 1/8W 470KOHM J	
65	RC20	RD-8P0T0103J	RES-CF,RD 1/8W 10KOHM J	
66	RC21	RD-8P0T0224J	RES-CF,RD 1/8W 220KOHM J	
67	RC22	RD-8P0T0331J	RES-CF,RD 1/8W 330 OHM J	
68	RC23	RD-8P0T0331J	RES-CF,RD 1/8W 330 OHM J	
69	RC26	RD-4P0T0750J	RES-CF,RD 1/4W 75 OHM J	
70	RC27	RD-4P0T0750J	RES-CF,RD 1/4W 75 OHM J	
71	RC28	RD-4P0T0750J	RES-CF,RD 1/4W 75 OHM J	
72	RC29	2402209007	RES-CF,22 0.5W J M	
73	RC30	2402209007	RES-CF,22 0.5W J M	
74	RC31	2402209007	RES-CF,22 0.5W J M	
75	RC33	RD-4P0T0224J	RES-CF,RD 1/4W 220K OHM J	
76	RC34	RD-4P0T0224J	RES-CF,RD 1/4W 220K OHM J	
77	RC35	RD-4P0T0224J	RES-CF,RD 1/4W 220K OHM J	
78	RC36	2404703005	RES-CF,470K 0.5W J M	
79	RC37	2401000008	RES-CF,100 0.5W J M	
80	RC38	RD-8P0T0331J	RES-CF,RD 1/8W 330 OHM J	
81	RC39	RD-8P0T0331J	RES-CF,RD 1/8W 330 OHM J	
82	RC40	RD-8P0T0331J	RES-CF,RD 1/8W 330 OHM J	

NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
83	RC41	RD-8P0T0562J	RES-CF,RD 1/8W 5.6K OHM J	
84	RC42	RD-8P0T0622J	RES-CF,RD 1/8W 6.2K OHM J	
85	RC43	RD-8P0T0562J	RES-CF,RD 1/8W 5.6K OHM J	
86	RC44	RD-8P0T0105J	RES-CF,RD 1/8W 1M OHM J	
87	RC45	RD-8P0T0331J	RES-CF,RD 1/8W 330 OHM J	
88	RC46	RD-8P0T0331J	RES-CF,RD 1/8W 330 OHM J	
89	RC47	RD-8P0T0472J	RES-CF,RD 1/8W 4.7K OHM J	
90	RC48	RD-8P0T0151J	RES-CF,RD 1/8W 150 OHM J	
91	RC49	RD-8P0T0102J	RES-CF,RD 1/8W 1K OHM J	
92	CC05	CC45CT1H220J	CAP-CD,50V 22PF J	
93	CC08	CE04BT1H010M	CAP-EL,SMS 50V 1UF M	
94	CC09	CE04BT1C221M	CAP-EL,SMS 16V 220UF M	
95	CC11	CQ92BT2A104J	CAP-PE,100V 0.1UF J	
96	CC12	CE04BT2A101M	CAP-EL,SMS 100V 100UF M	
97	CC13	2001090053	CAP-AL,1UF 100V M 5*11 NP	
98	CC14	2001090053	CAP-AL,1UF 100V M 5*11 NP	
99	CC15	2001090053	CAP-AL,1UF 100V M 5*11 NP	
100	CC19	2002280012	CAP-AL,0.22UF 160V M 5*11	
101	CC20	2002280012	CAP-AL,0.22UF 160V M 5*11	
102	CC21	2002280012	CAP-AL,0.22UF 160V M 5*11	
103	CC22	CE04BT2C100M	CAP-EL,SMS 160V 10UF M	
104	CC28	CE04BT1C221M	CAP-EL,SMS 16V 220UF M	
105	CC30	CQ92BT2A103J	CAP-PE,100V 0.01UF J	
106	CC31	CQ92BT2A103J	CAP-PE,100V 0.01UF J	
107	CC33	CE04BT1C101M	CAP-EL,SMS 16V 100UF M	
108	CC35	CE04BT1C101M	CAP-EL,SMS 16V 100UF M	
109	CC43	CE04BT1C470M	CAP-EL,SMS 16V 47UF M	
110	QC01	TTKSP45	TR,KSP45	
111	SGC01	3411100083	VARISTOR,SURGE ABSORBER R	
112	SGC02	3411100083	VARISTOR,SURGE ABSORBER R	
113	SGC03	3411100083	VARISTOR,SURGE ABSORBER R	
114	SGC04	3411100084	VARISTOR,SURGE ABSORBER R	
115	SGC05	3411100043	VARISTOR,S23 1500V 1500V	
116	ICC01	3204000577	IC-INT,MTV021 9LANGUAGE D	
117	ICC02	M11143008012	SCREW,BIN(+) M3*8 MSZPC	
118	ICC02	6124036603	H-SINK V,Q770	
119		6120052900	SHLD-CASE,F/S CRT ASY,Q79	
120		6120030100	GND-PL,SRTING T5870C	
121		6120052800	SHLD-CASE,F/S CRT,Q790	
122	CC17	CK45BN2H472K	CAP-CD,500V 4700PF K	
123	CC18	214104002701	CAP-M-P,104J 630V 7.5 T	
124	CNC01	3720101916	CONN-M,SMW200-14 14	

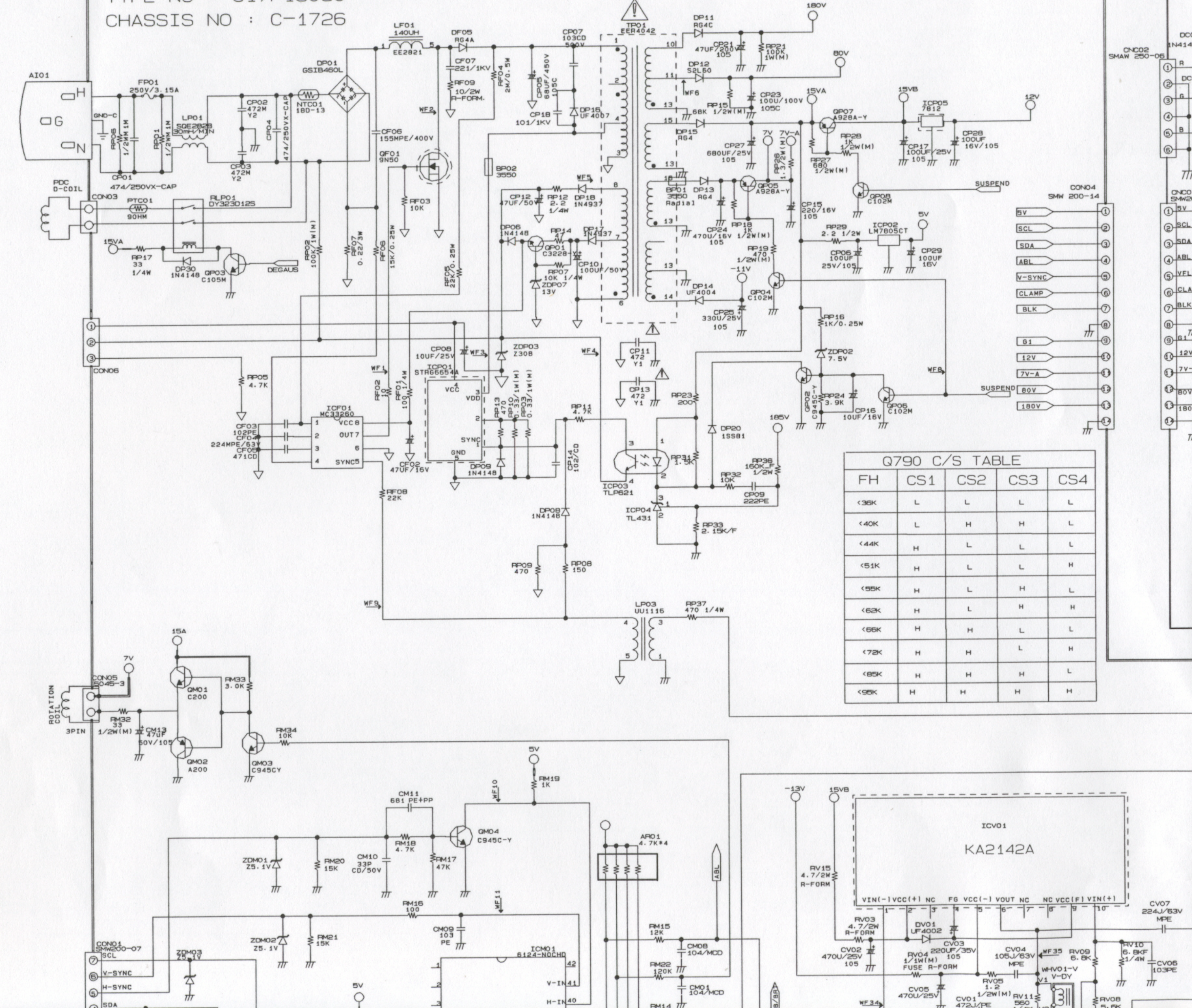
NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
125	CNC02	3720101388	CONN-M,SMW200-06P	
126	CNC03	375500076901	WIRE-ASS'Y,G2 300MM 7687B	
127	CNC04	372010105301	CONN-M,POST 1P DEGT235 14	
128	CNC05	3721101187	CONN-F,CRT SKT ISDW01S P9	
129	ICC02	3200001545	IC-LIN,LM2465 TO2	
130	ICC03	3200001528	IC-LIN,LM2479 DIP	
131	ICC04	3200001546	IC-LIN,LM1262 DIP	

Miscellaneous BOARD

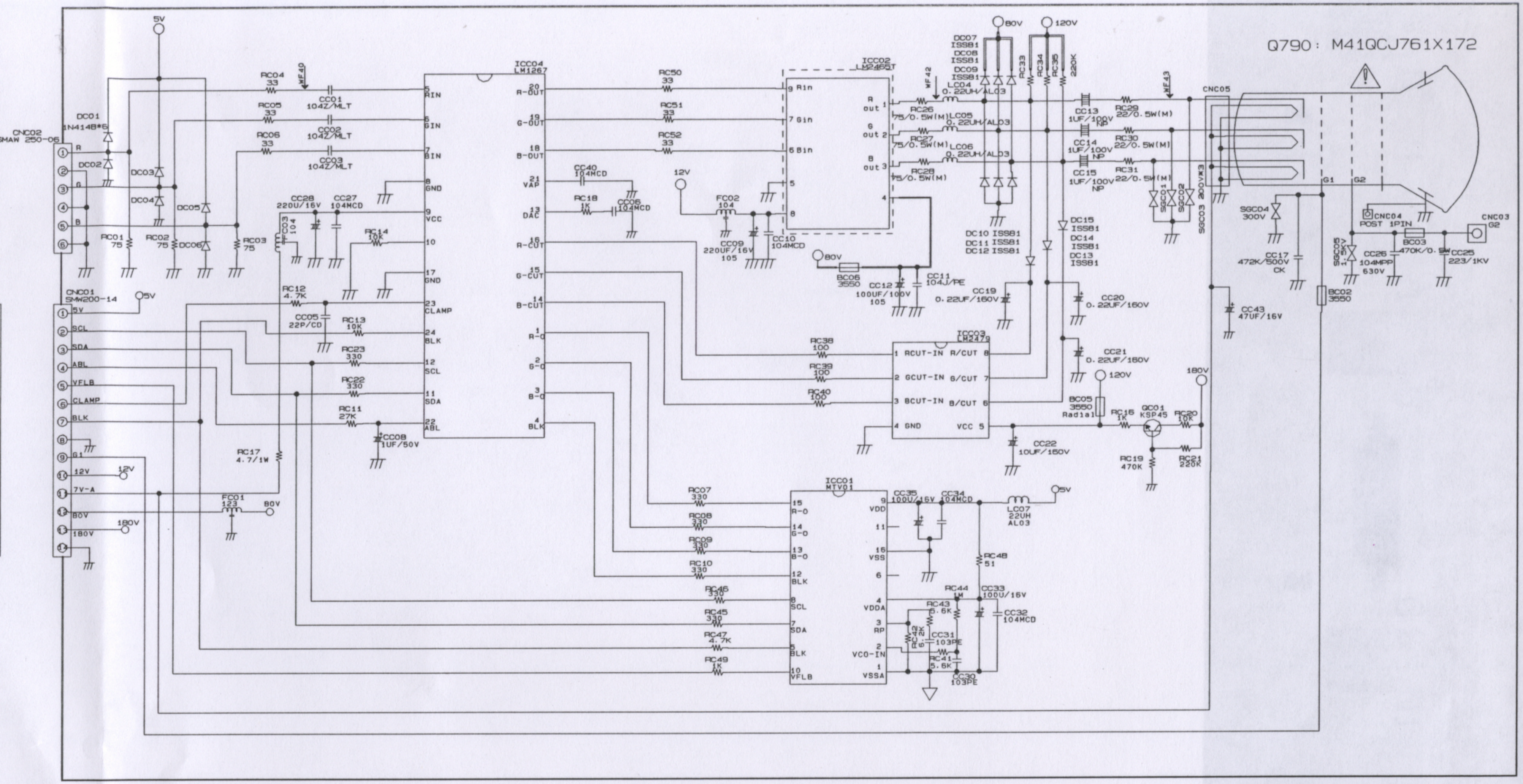
NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
1		B4210329401	PACKING ASSY,Q770_REPEAT	
2		B4209501203A	BAG PE,SET(RECYCLE MARK'G	
3		6243037901	MANUAL PE BAG	
4		6253115800	CUSHION RIGHT,Q770_REPEAT	
5		6253115900	CUSHION LEFT,Q770_REPEAT	
6		B4210329501	KIT COVER,Q790 IQT	
7		6201301000	COVER CLIP,Q770	
8		6201305000	COVER TOP ASSY,Q790	
9		6201296200	CAP GATE,Q770	
10		6201300600	COVER TOP,Q770_REPEAT	
11		6201305100	COVER BOTTOM ASSY,Q790	
12		6155037600	COIL-SP,SPRING Q770	
13		6201300700	COVER BOTTOM,Q770	
14		6215237000	KNOB POWER,Q770	
15		6215237100	KNOB V/R,Q770	
16		6220084900	LED LENS POWER,Q770	
17		E4205018801	MAIN ASSY,Q790 EXP	
18		B4008500100A	CABLE TIE	
19		B4008500100A	CABLE TIE	
20		M17744006012	SCREW,BIN(+) M4*6 MSZPC	
21		3540400027	MAG-FER,RING23.5PAI NI-ZN	
22		375500078906	WIRE-ASS'Y,COPPER ASSY Q7	
23		375850045401	CBL-SGN,Q770 ATTACH 1530M	
24		5004000204	SCR-TT,BIN + MC 3*8	
25		6101218201	CHASSIS MAIN ASSY,Q770	
26		6101218100	CHASSIS MASIN,Q770	
27		6120042800	SHIELD GROUND SPRING,V770	
28		6129027600	SPECIAL,T.T/W(+) 3*8 MSZP	
29	CON02	3725005222	CONN-A,6P SHIELD Q790 Q79	
30	CON04	3725005223	CONN-A,8P CBL+6P FLAT Q79	
31	CON06	3725005224	CONN-A,3P CBL Q790	
32	CON07	3725005229	CONN-A,5P CABLE Q790 5	
33		3500101863	INDUCT-FIX,D-COIL Q770 0.	
34		6120050300	SHLD-CASE,SHIELD PLATE Q7	
35		6120050801	SHLD-CASE COVER ASSY,Q770	
36		6120050200	SHIELD COVER,Q770	
37		6120051600	GROUND SPRING,Q770	
38		6225033000	INSULATION ANODE,Q770	
39		6225033200	INSULATION SHIELD,Q770	
40		6225033300	INSULATION SHLD REAR,Q770	
41		6128010135	WIRE,Q770 GASKET WIRE	
42		6225033100	INSULATION CRT,Q770	

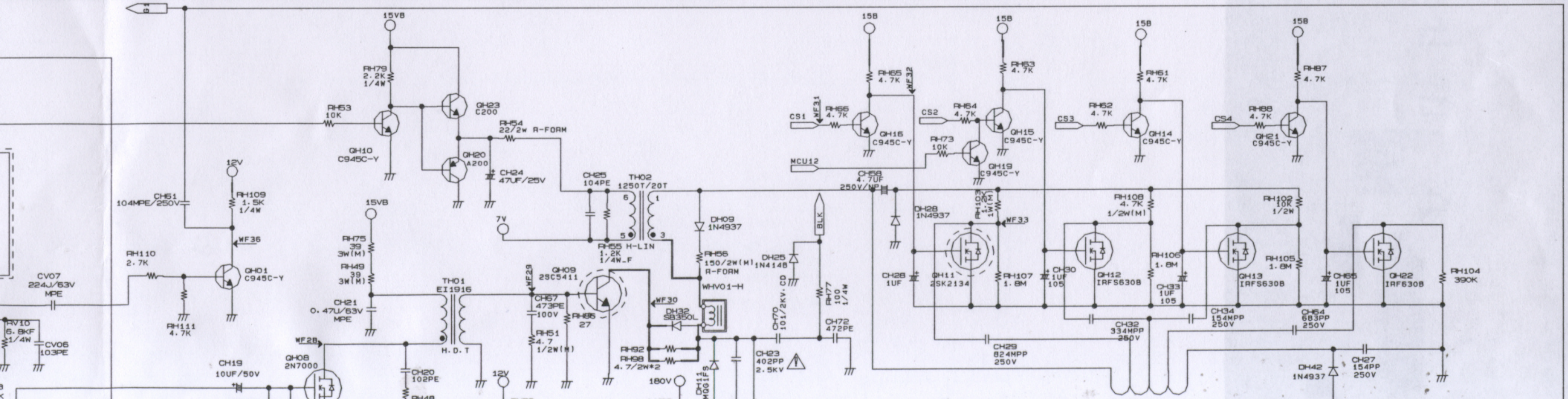
NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
43		6262005100	FOOTER,RUBBER PLATE,Q770	
44		3010100162	CRT,M41QCJ761X172 17" FLA	⚠
45		3758000200	CBL-PWR,MW WALL 1.8MT EUR	
46		6201303600	SWIVEL ASS'Y,Q770_REPEAT	
47		B4209531701A	BAG PE(SET)	
48		6201300800	SWIVEL UPPER,Q770	
49		6201300900	SWIVEL BASE,Q770	
50		6262004300	FOOTER,RUBBER FOOT	

MODEL : Q790
TYPE NO : C17F15090
CHASSIS NO : C-1726

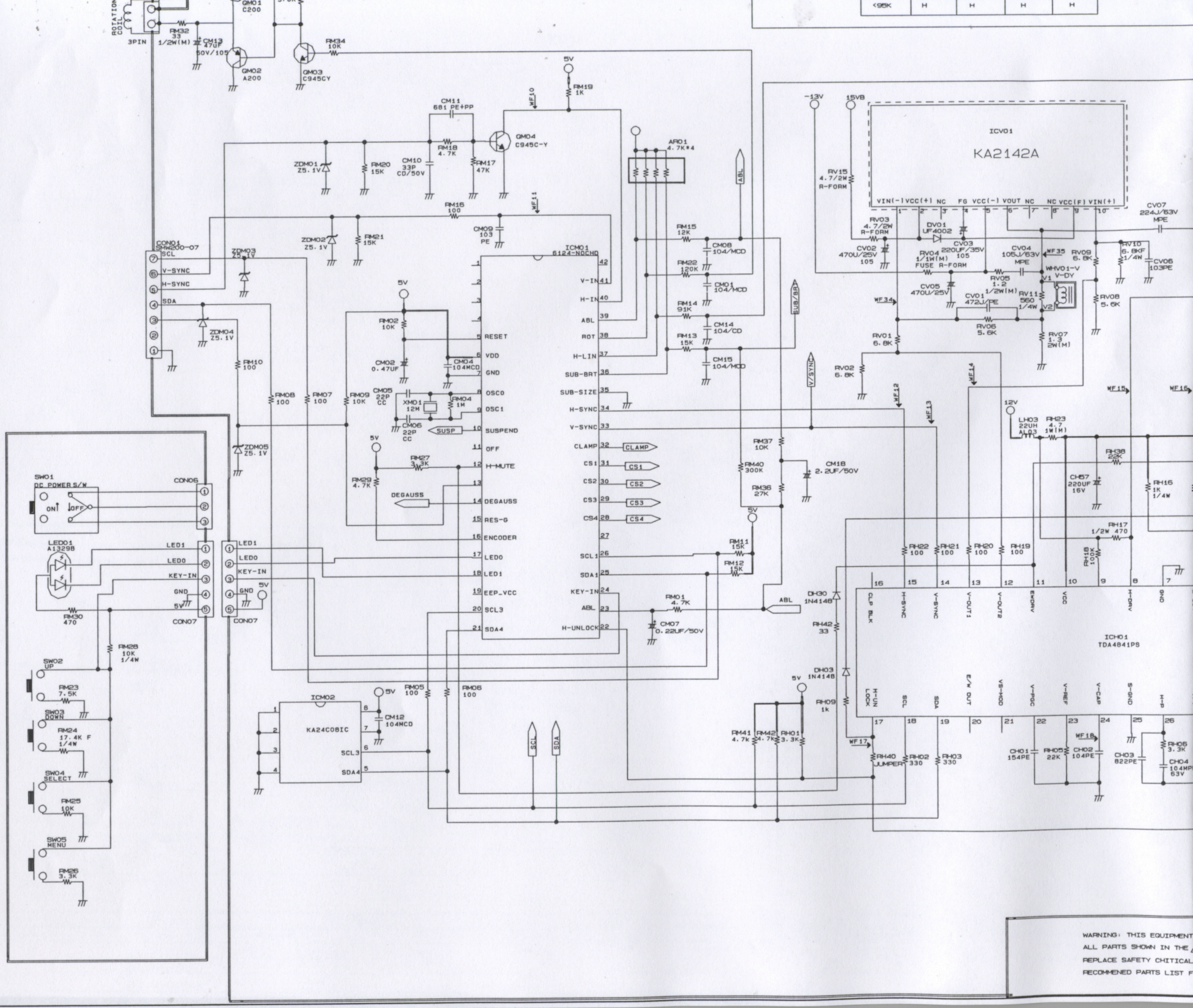

AI01
H
G
N
GND-C
FP01
250V/3.15A
RP06 1/2W 1M
RP01 1/2W 1M
CP01
474/250VX-CAP
LP01
SQE2828
30mH/MIN
CP02 472M Y2
CP03 472M Y2
CP04 474/250VX-CAP
NTC01 18D-13
DP01 GSIB460L
LF01 140UH EE2821
DF05 RG4A
CF07 221/1KV
RF09 10/2W R-FORM.
RF04 2W/0.5W
CF06 155MPE/400V
WF2
QF01 9N50
CP07 103CD 500V
CP05 68UF/450V 105C
CP18 101/1KV
DP16 UF4007
BP02 3550
RF03 10K
RF07 0.22/3W
RF06 15K/0.25W
RF05 22K/0.25W
RP02 100K/1W(M)
PDC D-COIL
CON03
PTC01 9OHM
RLP01 DY323D12S
15VA
RP17 33 1/4W
DP30 1N4148
QP03 C105M
DEGAUS
TP01 EER4042
DP11 RG4C
180V
CP21 47UF/200V 105
RP21 100K 1W(M)
DP12 S2L60
WF6
80V
CP23 100U/100V 105C
RP15 68K 1/2W(M)
15VA
15VB
QP07 A928A-Y
ICP05 7812
12V
CP28 100UF 16V/105
CP17 100UF/25V 105
RP28 1K 1/2W(M)
RP27 680 1/2W(M)
DP15 RG4
CP27 680UF/25V 105
7V
7V-A
RP26 1.3/2W(M)
BP01 3550 Rapial
DP13 RG4
QP05 A928A-Y
QP08 C102M
SUSPEND
CP15 220/16V 105
RP18 1K 1/2W(M)
CP24 470U/16V 105
RP29 2.2 1/2W
ICP02 LM7805CT
5V
CP06 100UF 25V/105
CP29 100UF 16V
RP19 470 1/2W(M)
-11V
QP04 C102M
DP14 UF4004
CP25 330U/25V 105
RP16 1K/0.25W
WF5
CP12 47UF/50V
RP12 2.2 1/4W
DP18 1N4937
DP06 1N4148
RP14 47
DP17 1N4937
QP01 C3228-Y
RP07 10K 1/4W
CP10 100UF/50V
ZDP07 13V
CON06
RP05 4.7K
CP08 10UF/25V
WF3
ZDP03 Z308
WF4
CP11 472 Y1
CP13 472 Y1
WF1
ICP01 STR66654A
VCC
VDD
SYNC
GND
RP02
RF01 100 1/4W
RP13 470
RP10 0.33/1W(M)
RP03 0.33/1W(M)
RP11 4.7K
CP14 102/CD
DP09 1N4148
CF02 47UF/16V
ICF01 MC33260
VCC
OUT
SYNC
CF03 102PE
CF04 224MPE/63V
CF05 471CD
RF08 22K
ICP03 TLP621
RP23 200
DP20 1SS81
185V
RP31 1.5K
RP36 160K_F 1/2W
RP32 10K
CP09 222PE
ICP04 TL431
RP33 2.15K/F
ZDP02 7.5V
QP02 C945C-Y
RP24 3.9K
CP16 10UF/16V
QP06 C102M
WF8
CON04 SMW 200-14
5V
SCL
SDA
ABL
V-SYNC
CLAMP
BLK
G1
12V
7V-A
80V
180V
DP08 1N4148
RP09 470
RP08 150
WF9
LP03 UU1116
RP37 470 1/4W
CNC02 SMAW 250-06
R
G
B
15A
7V
CON05 5045-3
ROTATION COIL
3PIN
RM32 33 1/2W(M)
CM13 47UF 50V/105
QM01 C200
QM02 A200
RM33 3.0K
QM03 C945CY
RM34 10K
5V
RM19 1K
WF10
CM11 681 PE+PP
QM04 C945C-Y
RM18 4.7K
RM17 47K
ZDM01 Z5.1V
RM20 15K
CM10 33P CD/50V
AR01 4.7K*4
ABL
RM16 100
WF11
ZDM02 Z5.1V
RM21 15K
CM09 103 PE
ICM01 6124-NOCHD
V-IN
H-IN
CON01 SMW200-07
SCL
V-SYNC
H-SYNC
SDA
ZDM03 Z5.1V
RM15 12K
CM08 104/MCD
RM22 120K
CM01 104/MCD
RM14
-13V
15VB
ICV01
KA2142A
VIN(-) VCC(+) NC FG VCC(-) VOUT NC NC VCC(F) VIN(+)
RV15 4.7/2W R-FORM
RV03 4.7/2W R-FORM
CV02 470U/25V 105
DV01 UF4002
CV03 220UF/35V 105
RV04 1/1W(M) FUSE R-FORM
CV04 105J/63V MPE
WF35
RV09 6.8K
RV10 6.8KF 1/4W
CV06 103PE
CV07 224J/63V MPE
WHV01-V V-DY
RV05 1.2 1/2W(M)
CV05 470U/25V
CV01 472J/PE
RV11 560
RV08
WF34

Q790 C/S TABLE				
FH	CS1	CS2	CS3	CS4
<36K	L	L	L	L
<40K	L	H	H	L
<44K	H	L	L	L
<51K	H	L	L	H
<55K	H	L	H	L
<62K	H	L	H	H
<66K	H	H	L	L
<72K	H	H	L	H
<85K	H	H	H	L
<95K	H	H	H	H

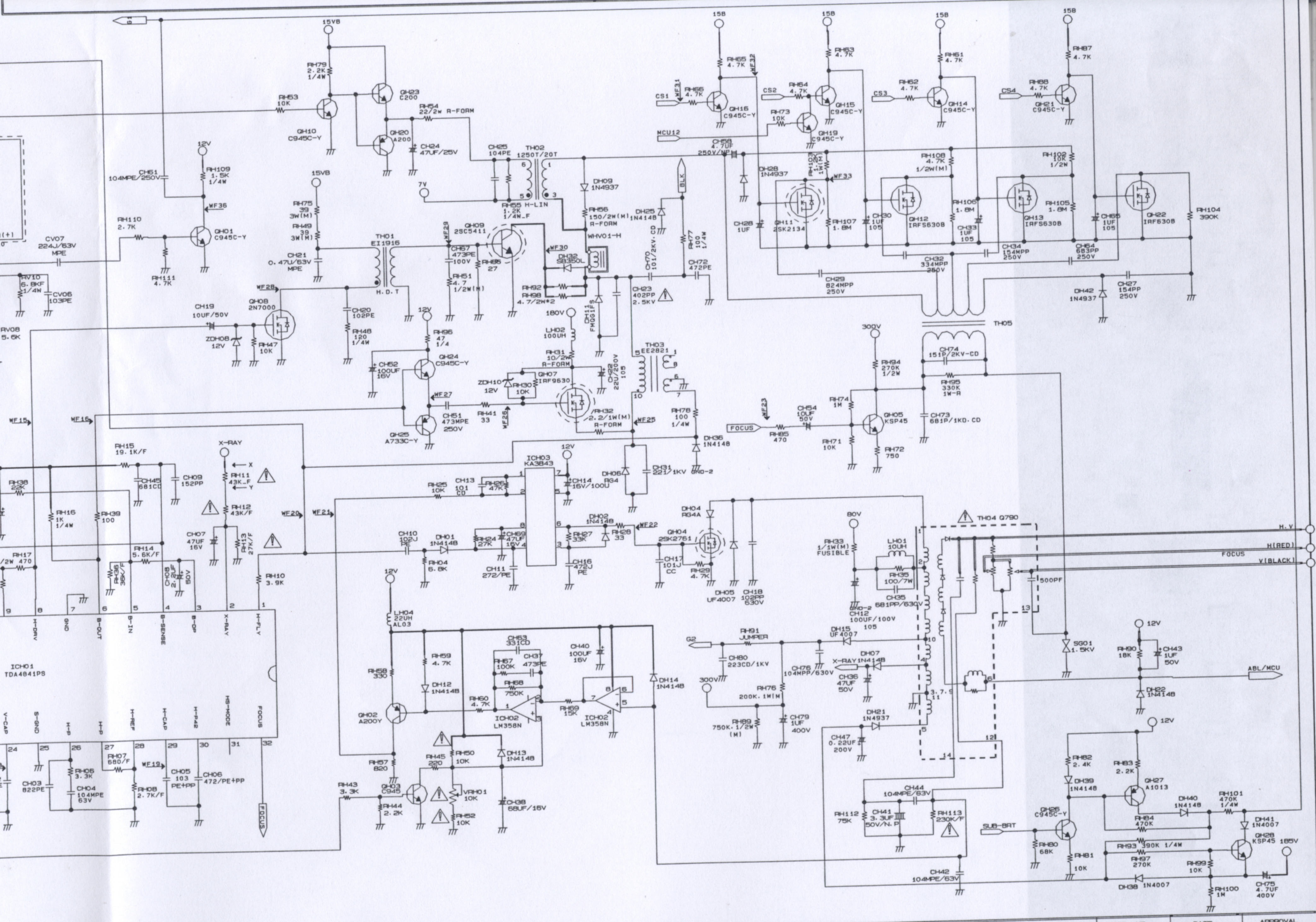

Q790: M41QCJ761X172
CNC02 SMAW 250-06
R
G
B
DC01 1N4148*6
DC02
DC03
DC04
DC05
DC06
RC01 75
RC02 75
RC03 75
5V
RC04 33
RC05 33
RC06 33
WF40
CC01 104Z/MLT
CC02 104Z/MLT
CC03 104Z/MLT
ICC04 LM1267
RIN
GIN
BIN
GND
VCC
CLAMP
BLK
SCL
SDA
ABL
R-OUT
G-OUT
B-OUT
VAP
DAC
R-CUT
G-CUT
B-CUT
R-O
G-O
B-O
CC28 220U/16V
CC27 104MCD
FC03 104
RC14 10K
CC40 104MCD
RC18 1K
CC06 104MCD
RC12 4.7K
CC05 22P/CD
RC13 10K
RC23 330
RC22 330
RC11 27K
CC08 1UF/50V
RC17 4.7/1W
CNC01 SMW200-14
5V
SCL
SDA
ABL
VFLB
CLAMP
BLK
G1
12V
7V-A
80V
180V
FC01 123
RC50 33
RC51 33
RC52 33
ICC02 LM2465T
R in
G in
B in
R out
G out
B out
12V
FC02 104
CC09 220UF/16V 105
CC10 104MCD
80V
BC06 3550
CC12 100UF/100V 105
CC11 104J/PE
WF42
LC04 0.22UH/AL03
LC05 0.22UH/AL03
LC06 0.22UH/AL03
RC26 75/0.5W(M)
RC27 75/0.5W(M)
RC28 75/0.5W(M)
DC07 1SS81
DC08 1SS81
DC09 1SS81
DC10 1SS81
DC11 1SS81
DC12 1SS81
DC13 1SS81
DC14 1SS81
DC15 1SS81
RC33
RC34
RC35
220K
120V
CC13 1UF/100V NP
CC14 1UF/100V NP
CC15 1UF/100V NP
RC29 22/0.5W(M)
RC30 22/0.5W(M)
RC31 22/0.5W(M)
WF43
CNC05
SGC01
SGC02
SGC03 200VX3
SGC04 300V
CC17 472K/500V CK
CC43 47UF/16V
BC02 3550
G1
G2
CNC04 POST 1PIN
SGC05 1.5KV
CC26 104MPP 630V
BC03 470K/0.5W
CC25 223/1KV
CNC03 G2
CC19 0.22UF/160V
CC20 0.22UF/160V
CC21 0.22UF/160V
ICC03 LM2479
RCUT-IN
GCUT-IN
BCUT-IN
GND
R/CUT
G/CUT
B/CUT
VCC
RC38 100
RC39 100
RC40 100
CC22 10UF/160V
120V
BC05 3550 Radial
RC15 1K
QC01 KSP45
RC20 10K
180V
RC19 470K
RC21 220K
ICC01 MTV01
VDD
VSS
VDDA
RP
VCO-IN
VSSA
VFLB
CC35 100U/16V
CC34 104MCD
LC07 22UH AL03
5V
RC48 51
RC44 1M
CC33 100U/16V
CC32 104MCD
RC43 5.6K
RC42 6.2K
CC31 103PE
RC41 5.6K
CC30 103PE
RC07 330
RC08 330
RC09 330
RC10 330
RC46 330
RC45 330
RC47 4.7K
RC49 1K


G1
15VB
RH79 2.2K 1/4W
QH23 C200
RH53 10K
QH10 C945C-Y
QH20 A200
RH54 22/2W R-FORM
CH24 47UF/25V
CH61 104MPE/250V
12V
RH109 1.5K 1/4W
WF36
RH110 2.7K
QH01 C945C-Y
RH111 4.7K
CV07 224J/63V MPE
RV10 6.8KF 1/4W
CV06 103PE
15VB
RH75 39 3W(M)
RH49 39 3W(M)
CH21 0.47U/63V MPE
TH01 EI1916
H.D.T
WF28
QH08 2N7000
CH19 10UF/50V
CH20 102PE
RH48
7V
WF29
CH57 473PE 100V
RH51 4.7 1/2W(M)
QH09 2SC5411
RH86 27
CH25 104PE
TH02 1250T/20T
H-LIN
RH55 1.2K 1/4W_F
WF30
DH32 SB350L
RH92
RH98 4.7/2W*2
DH09 1N4937
RH56 150/2W(M) R-FORM
WHV01-H
DH25 1N4148
CH70 101/2KV.CD
BLK
RH77 100 1/4W
CH72 472PE
CH23 402PP 2.5KV
12V
180V
DH11
15B
RH65 4.7K
WF32
WF31
CS1
RH66 4.7K
QH16 C945C-Y
CS2
RH64 4.7K
QH15 C945C-Y
RH63 4.7K
RH73 10K
MCU12
QH19 C945C-Y
CH58 4.7UF 250V/NP
DH28 1N4937
RH106 1M
WF33
CH28 1UF
QH11 2SK2134
RH107 1.8M
CH30 1UF 105
CH29 824MPP 250V
CS3
RH62 4.7K
RH61 4.7K
QH14 C945C-Y
RH108 4.7K 1/2W(M)
QH12 IRFS630B
RH106 1.8M
CH33 1UF 105
CH32 334MPP 250V
CH34 154MPP 250V
CS4
RH88 4.7K
RH87 4.7K
QH21 C945C-Y
RH102 10K 1/2W
QH13 IRFS630B
RH105 1.8M
CH65 1UF 105
CH64 683PP 250V
QH22 IRF630B
RH104 390K
DH42 1N4937
CH27 154PP 250V

<95K	H	H	H	H


ROTATION COIL
3PIN
RM32 33 1/2W(M)
CM13 47UF 50V/105
QM01 C200
QM02 A200
QM03 C945CY
RM34 10K
5V
RM19 1K
WF10
CM11 681 PE+PP
QM04 C945C-Y
RM18 4.7K
RM17 47K
CM10 33P CD/50V
ZDM01 Z5.1V
RM20 15K
RM16 100
WF11
ZDM02 Z5.1V
RM21 15K
CM09 103 PE
AR01 4.7K*4
ABL
CON01 SMW200-07
SCL
V-SYNC
H-SYNC
SDA
ZDM03 Z5.1V
ZDM04 Z5.1V
RM10 100
RM08 100
RM07 100
RM09 10K
ZDM05 Z5.1V
ICM01 6124-NDCHD
RESET
VDD
GND
OSC0
OSC1
SUSPEND
OFF
H-MUTE
DEGAUSS
RES-G
ENCODER
LED0
LED1
EEP_VCC
SCL3
SDA4
V-IN
H-IN
ABL
ROT
H-LIN
SUB-BRT
SUB-SIZE
H-SYNC
V-SYNC
CLAMP
CS1
CS2
CS3
CS4
SCL1
SDA1
KEY-IN
H-UNLOCK
RM02 10K
CM02 0.47UF
CM04 104MCD
CM05 22P CC
XM01 12M
RM04 1M
CM06 22P CC
SUSP
RM27 3.3K
RM29 4.7K
RM15 12K
CM08 104/MCD
RM22 120K
CM01 104/MCD
RM14 91K
CM14 104/CD
RM13 15K
CM15 104/MCD
SUB/BRT
V/SYNC
RM37 10K
RM40 300K
RM36 27K
CM18 2.2UF/50V
RM11 15K
RM12 15K
RM01 4.7K
CM07 0.22UF/50V
SW01 DC POWER S/W
ON OFF
CON06
LED01 A1329B
LED1
LED0
KEY-IN
GND
5V
RM30 470
CON07
RM28 10K 1/4W
SW02 UP
RM23 7.5K
SW03 DOWN
RM24 17.4K F 1/4W
SW04 SELECT
RM25 10K
SW05 MENU
RM26 3.3K
ICM02 KA24C08IC
SCL3
SDA4
CM12 104MCD
RM05 100
RM06 100
SCL
SDA
-13V
15VB
ICV01
KA2142A
VIN(-) VCC(+) NC FG VCC(-) VOUT NC NC VCC(F) VIN(+)
RV15 4.7/2W R-FORM
RV03 4.7/2W R-FORM
DV01 UF4002
CV03 220UF/35V 105
CV02 470U/25V 105
RV04 1/1W(M) FUSE R-FORM
CV04 105J/63V MPE
WF35
RV09 6.8K
RV10 6.8KF 1/4W
CV06 103PE
CV07 224J/63V MPE
WHV01-V V-DY
V1 V2
RV05 1.2 1/2W(M)
RV11 560 1/4W
CV05 470U/25V
CV01 472J/PE
RV06 5.6K
RV08 5.6K
RV07 1.3 2W(M)
WF34
RV01 6.8K
RV02 6.8K
WF14
WF12
WF13
WF15
WF16
12V
LH03 22UH AL03
RH23 4.7 1W(M)
RH38 22K
CH57 220UF 16V
RH16 1K 1/4W
RH17 1/2W 470
RH18 100K
RH22 100
RH21 100
RH20 100
RH19 100
CLP BLK
H-SYNC
V-SYNC
V-OUT1
V-OUT2
EWDRV
VCC
H-DRV
GND
ICH01 TDA4841PS
H-UN LOCK
SCL
SDA
E/W OUT
VS-HOD
V-POC
V-REF
V-CAP
S-GND
H-P
DH30 1N4148
RH42 33
DH03 1N4148
RH09 1k
RM41 4.7k
RM42 4.7k
RH01 3.3K
WF17
RH40 JUMPER
RH02 330
RH03 330
CH01 154PE
RH05 22K
WF18
CH02 104PE
CH03 822PE
RH06 3.3K
CH04 104MP 63V

WARNING: THIS EQUIPMENT
ALL PARTS SHOWN IN THE ⚠
REPLACE SAFETY CHITICAL
RECOMMENED PARTS LIST F


15V8
RH79 2.2K 1/4W
QH23 C200
RH53 10K
QH10 C945C-Y
RH54 22/2W R-FORM
QH20 A200
CH24 47UF/25V
CH25 104PE
TH02 1250T/20T
H-LIN
7V
RH55 1.2K 1/4W_F
DH09 1N4937
RH56 150/2W(M) R-FORM
WHV01-H
DH25 1N4148
BLK
RH77 1K 1/4W
CH70 101/2KV.CD
CH72 472PE
12V
RH109 1.5K 1/4W
CH61 104MPE/250V
WF36
QH01 C945C-Y
RH110 2.7K
RH111 4.7K
CV07 224J/63V MPE
RV10 6.8KF 1/4W
CV06 103PE
RV08 5.6K
RH75 39 3W(M)
RH49 39 3W(M)
CH21 0.47U/63V MPE
TH01 EI1916
H.D.T
WF29
CH57 473PE 100V
QH09 2SC5411
RH86 27
RH51 4.7 1/2W(M)
WF30
DH32 SB350L
RH92
RH98 4.7/2W*2
CH23 402PP 2.5KV
WF28
QH08 2N7000
CH19 10UF/50V
ZDH08 12V
RH47 10K
CH20 102PE
RH48 120 1/4W
RH96 47 1/4
QH24 C945C-Y
CH52 100UF 16V
WF27
QH25 A733C-Y
CH51 473MPE 250V
RH41 33
WF26
180V
LH02 100UH
DH11 FMG1FS
RH31 10/2W R-FORM
QH07 IRF9630
ZDH10 12V
RH30 10K
CH22 22U/200V 105
RH32 2.2/1W(M) R-FORM
WF25
TH03 EE2821
RH76 100 1/4W
DH36 1N4148
GND-2
15B
RH65 4.7K
WF32
RH66 4.7K
WF31
CS1
QH16 C945C-Y
RH63 4.7K
RH64 4.7K
CS2
QH15 C945C-Y
RH73 10K
QH19 C945C-Y
MCU12
RH61 4.7K
RH62 4.7K
CS3
QH14 C945C-Y
RH87 4.7K
RH88 4.7K
CS4
QH21 C945C-Y
CH58 4.7UF 250V/NP
DH28 1N4937
WF33
CH28 1UF
QH11 2SK2134
RH107 1.8M
CH30 1UF 105
RH108 4.7K 1/2W(M)
QH12 IRFS630B
RH106 1.8M
CH33 1UF 105
RH102 10K 1/2W
QH13 IRFS630B
RH105 1.8M
CH65 1UF 105
QH22 IRF630B
RH104 390K
CH34 154MPP 250V
CH32 334MPP 250V
CH64 683PP 250V
CH29 824MPP 250V
DH42 1N4937
CH27 154PP 250V
TH05
300V
RH94 270K 1/2W
CH74 151P/2KV-CD
RH95 330K 1W-R
RH74 1M
WF23
CH54 10UF 50V
FOCUS
RH85 470
QH05 KSP45
CH73 681P/1KD.CD
RH71 10K
RH72 750
WF15
WF16
RH15 19.1K/F
X-RAY
RH11 43K_F
RH12 43K/F
RH13 27K/F
CH45 681CD
CH09 152PP
RH38 22K
RH16 1K 1/4W
RH39 100
CH07 47UF 16V
RH14 5.6K/F
RH36 36K/F
CH08 2.2UF 50V
RH17 470
WF20
WF21
RH10 3.9K
ICH03 KA3843
RH25 10K
CH13 101 CD
RH26 47K
CH14 16V/100U
DH06 RG4
CH31 221/1KV
CH10 102J PE
DH01 1N4148
RH24 27K
CH69 47UF 16V
RH04 6.8K
CH11 272/PE
DH02 1N4148
RH27 33K
RH28 33
WF22
CH16 472J PE
QH04 2SK2761
CH17 101J CC
RH29 4.7K
DH04 RG4A
DH05 UF4007
CH18 102PP 630V
80V
RH33 1/1W(M) FUSIBLE
LH01 10UH
RH35 100/7W
CH35 681PP/630V
CH12 100UF/100V 105
TH04 Q790
H.V
H(RED)
FOCUS
V(BLACK)
500PF
SG01 1.5KV
ICH01 TDA4841PS
H-DRV
GND
B-OUT
B-IN
B-SENSE
B-OP
X-RAY
H-FLY
V-CAP
S-GND
H-P
H-P
H-REF
H-CAP
H-P42
HS-MODE
FOCUS
RH07 680/F
RH06 3.3K
CH04 104MPE 63V
CH03 822PE
RH08 2.7K/F
WF19
CH05 103 PE+PP
CH06 472/PE+PP
12V
LH04 22UH AL03
RH59 4.7K
RH58 330
DH12 1N4148
CH53 331CD
RH67 100K
CH37 473PE
RH68 750K
RH60 4.7K
QH02 A200Y
ICH02 LM358N
CH40 100UF 16V
RH69 15K
DH14 1N4148
RH45 220
RH50 10K
DH13 1N4148
RH57 820
RH43 3.3K
QH03 C945
RH44 2.2K
VRH01 10K
RH52 10K
CH38 68UF/16V
G2
RH91 JUMPER
CH80 223CD/1KV
CH76 104MPP/630V
DH15 UF4007
DH07 1N4148
X-RAY
CH36 47UF 50V
300V
RH76 200K.1W(M)
RH89 750K.1/2W (M)
CH79 1UF 400V
DH21 1N4937
CH47 0.22UF 200V
CH44 104MPE/63V
RH112 75K
CH41 3.3UF 50V/N.P
RH113 230K/F
CH42 104MPE/63V
RH90 18K
CH43 1UF 50V
ABL/MCU
DH22 1N4148
RH82 2.4K
RH83 2.2K
QH27 A1013
DH39 1N4148
QH26 C945C-Y
DH40 1N4148
RH101 470K 1/4W
DH41 1N4007
SUB-BRT
RH84 470K
RH80 68K
RH81 10K
RH93 390K 1/4W
RH97 270K
RH99 10K
QH28 KSP45
185V
DH38 1N4007
RH100 1M
CH75 4.7UF 400V

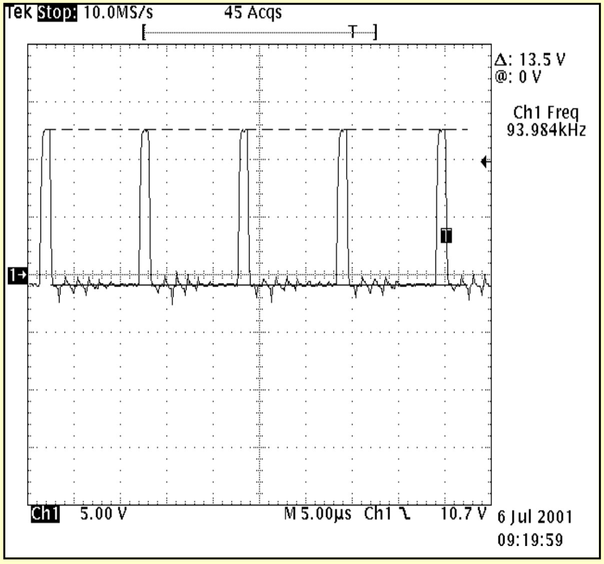
ARNING: THIS EQUIPMENT CONTAINS SAFETY & CDRH CRITICAL COMPONENTS
LL PARTS SHOWN IN THE ⚠ MARKS OF THE SCHEMATIC ARE SAFETY
EPLACE SAFETY CHITICAL COMPONENTS ONLY WITH MANUFACTURERS
ECOMMENED PARTS LIST FOR EXACT REPLACEMENTS.

NOTE:
1. RESISTANCE IS SHOWN IN OHM K=1.000 M=1.000.000 RATED POWER OF RESISTOR NOT NOTED IN SCHEMATIC DIAGRAM IS 1/8W R-CARBON.
2. CAPACITANCE IS SHOWN pF AND NOTED CAPACITANCES IS SHOWN uF. uF=1.000.000pF RATED VOLTAGE OF CONDENCER NOT NOTED IN SCHEMATIC DIAGRAM IS 50V.
3. ABBREVIATION AND SYMBOL
P: POLYESTER PP: POLYPROPYLENE
4. THIS SCHEMATIC DIAGRAM IS SUBJECTED TO CHANGE WITHOUT NOTICE FOR FURTHER IMPROVEMENT.

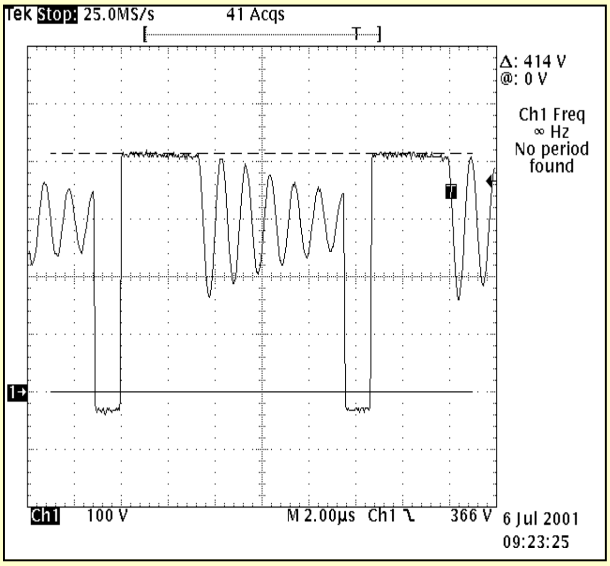
DWG. REV.	A	DESCRIPTION		DOC. NO.	DATE	APPROVAL
DWG. NO.	E42095388		SIGNATURE	DATE	INSP	SHEET NO.
TITLE	Q790	DWN	D. Y. KIM	2002.05.24		1/1
		CHK	B. H. KIM	2002.05.24		
ImageQuest		APP	Y. K. BYUN	2002.05.24		

Wave Form

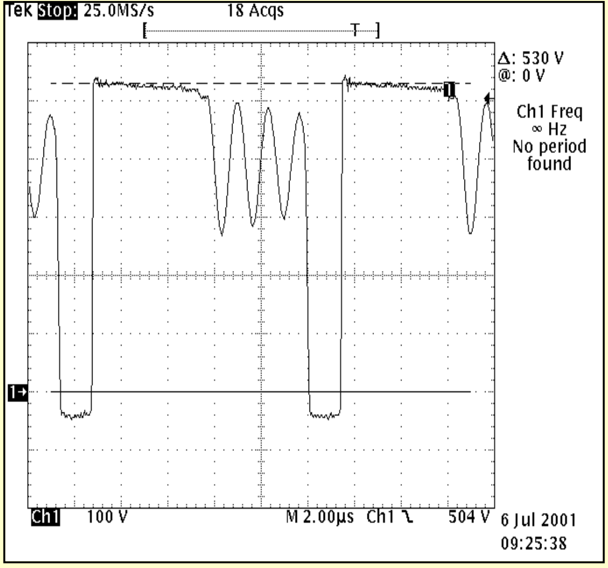
WF1).QF01 Gate



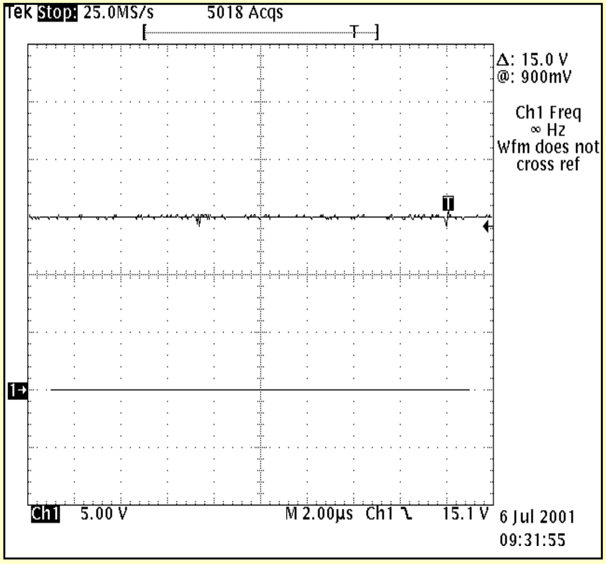
WF2).QF01 Drain



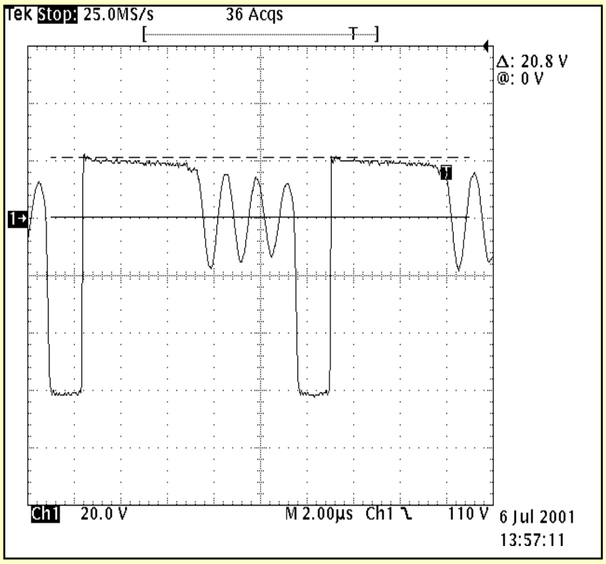
WF3).ICP01 PIN 3



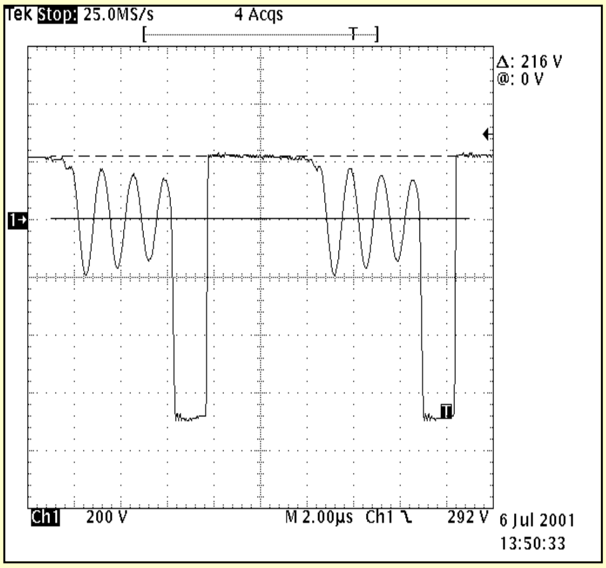
WF4).ICP03 PIN 4



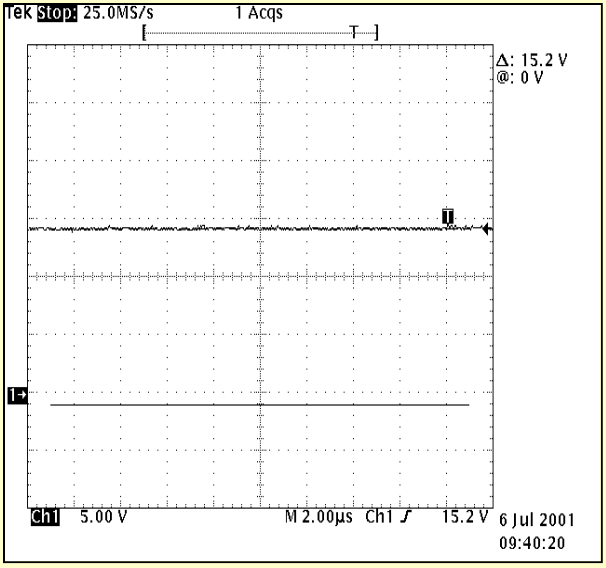
WF5).TP01 PIN 8



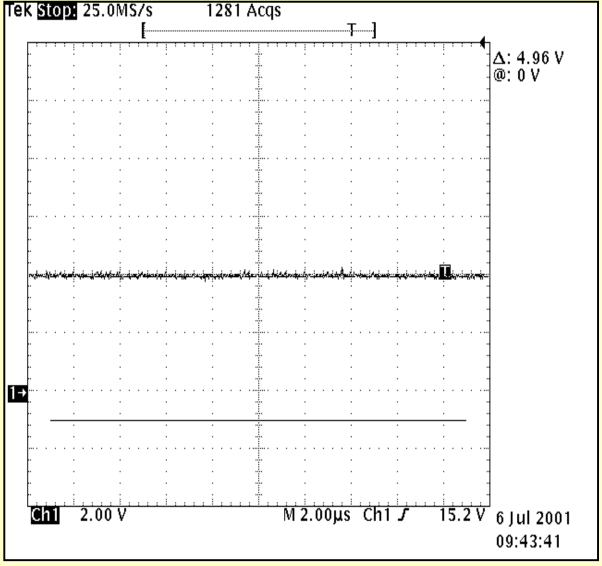
WF6).TP01 PIN 6



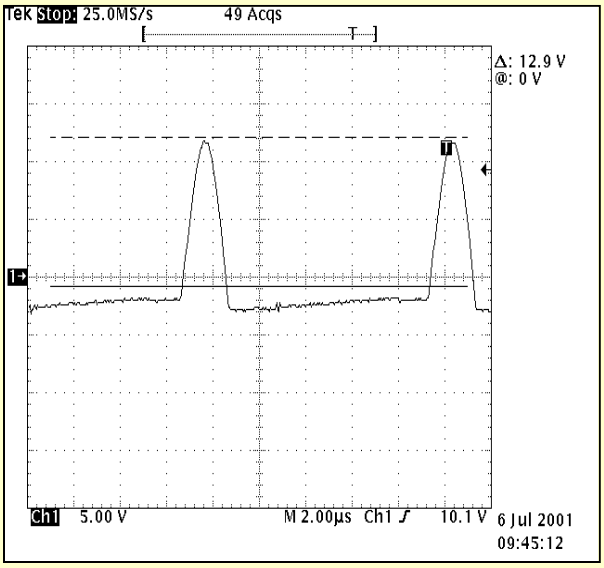
WF7)QP07 Collector



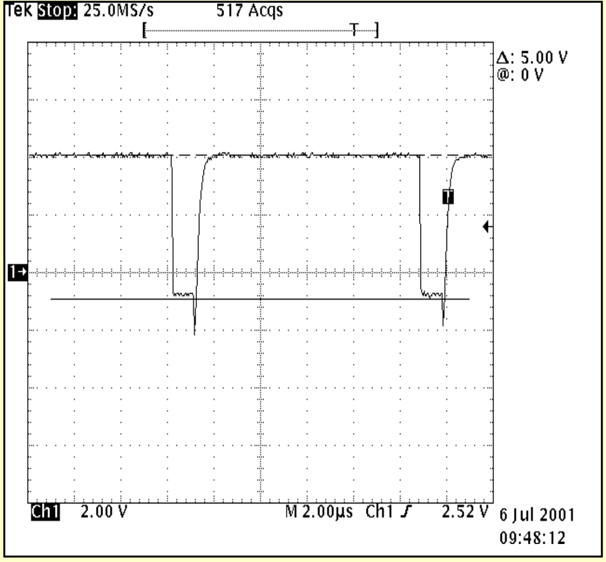
WF8).QP08 Base



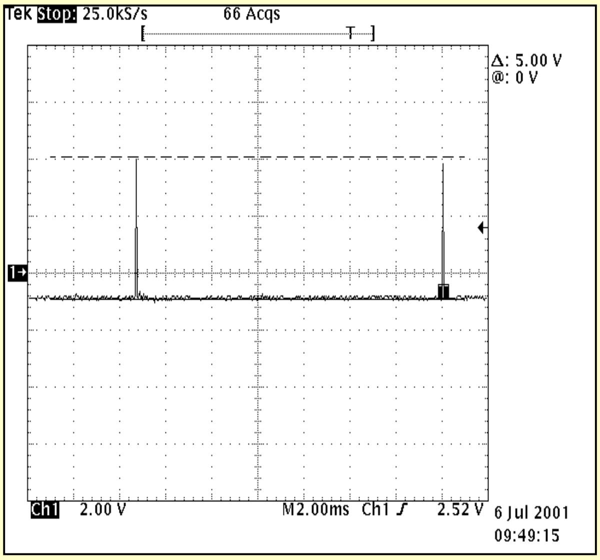
WF9).LP03 PIN 4



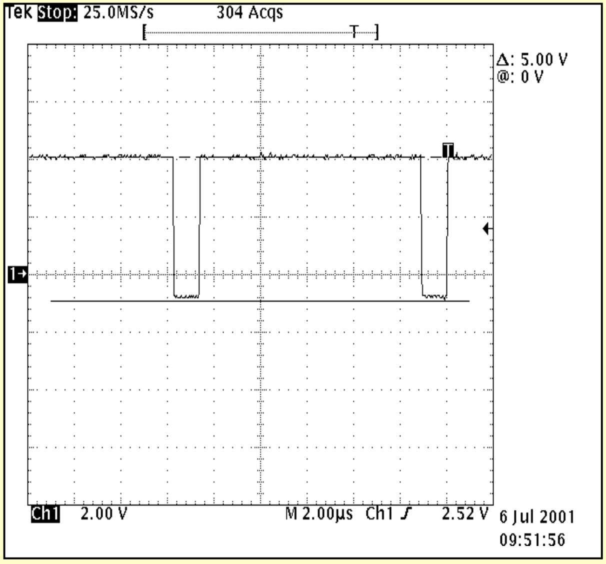
WF10).QM04 Collector



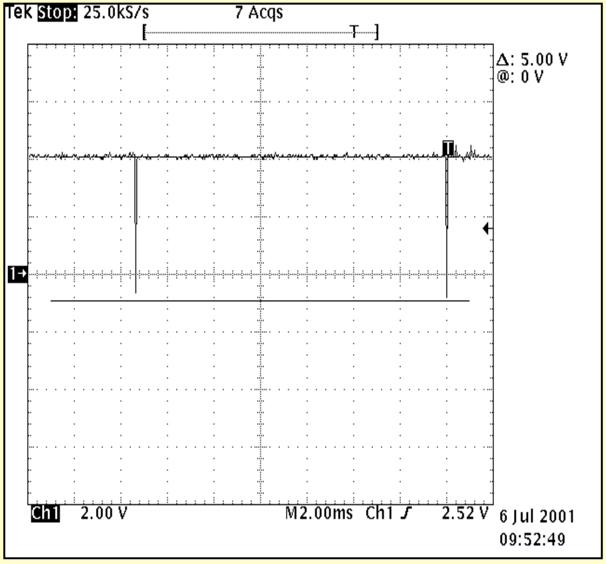
WF11).ICM01 PIN 41



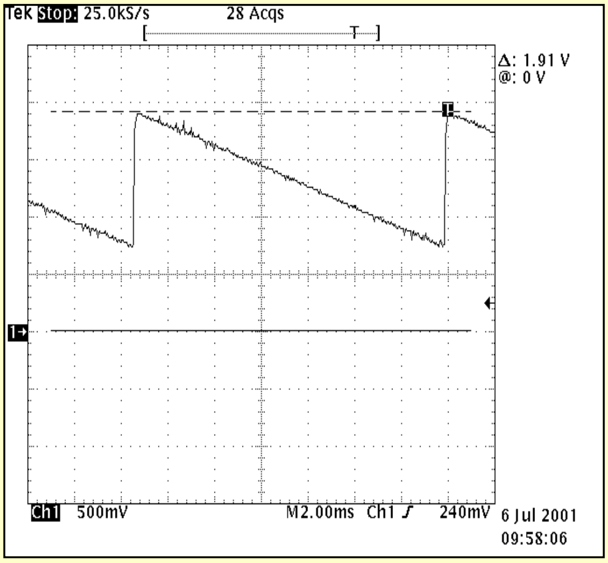
WF12).ICM01 PIN 34



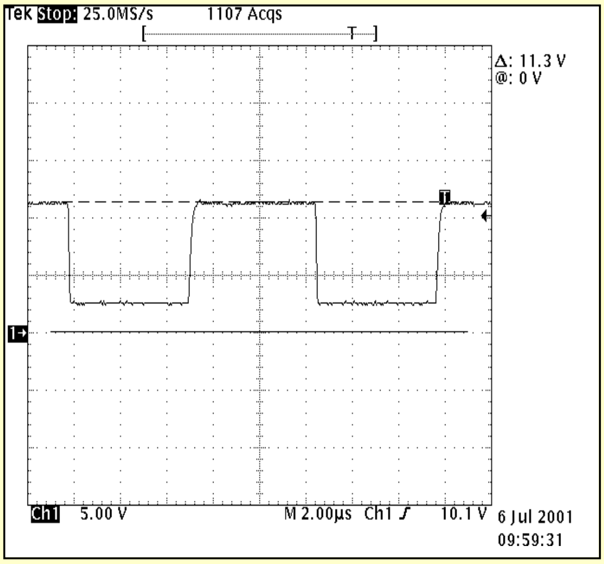
WF13).ICM01 PIN 33



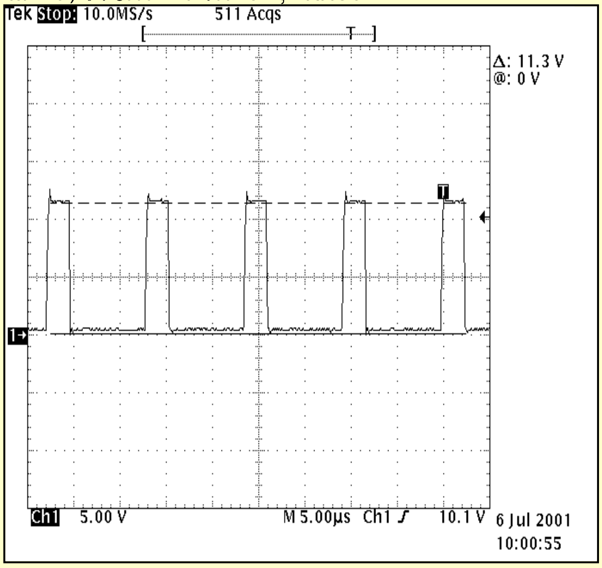
WF14).ICH01 PIN13 , RH20



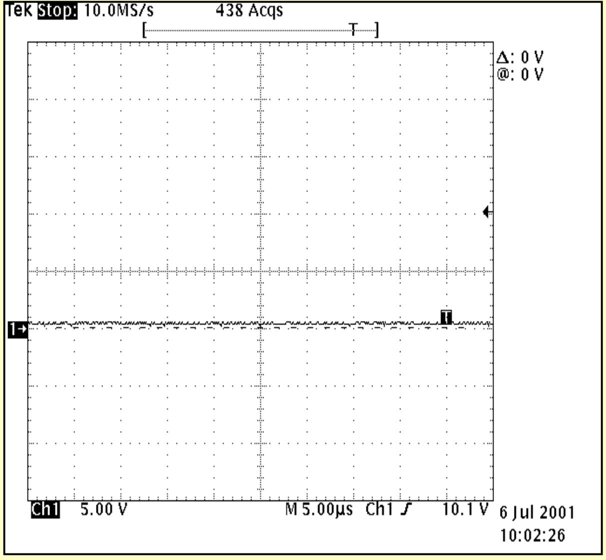
WF15).ICH01 PIN 8



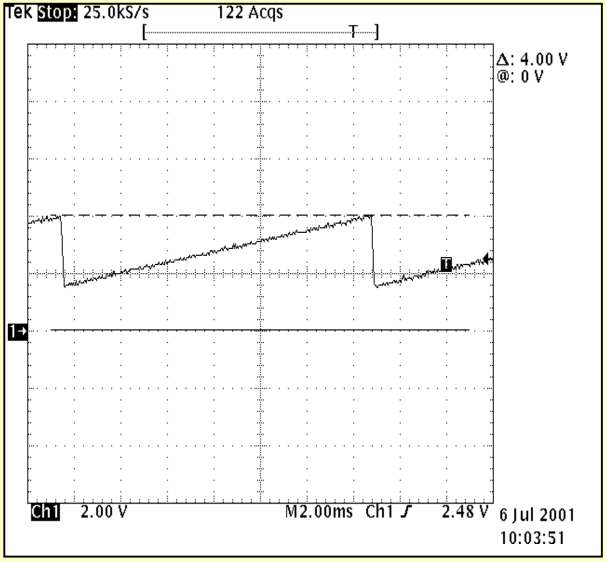
WF16).ICH01 PIN 6 , RH39



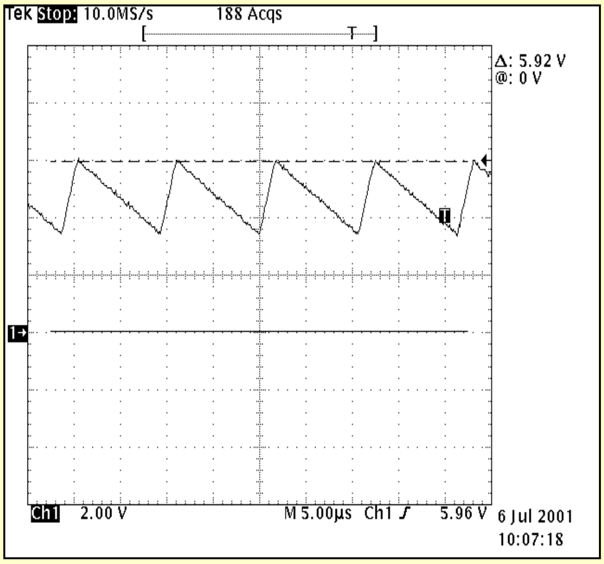
WF17).ICH01 PIN 17



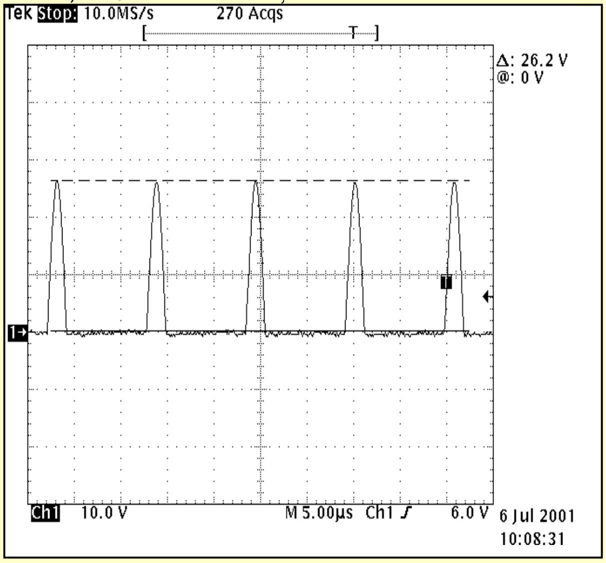
WF18).ICH01 PIN 24



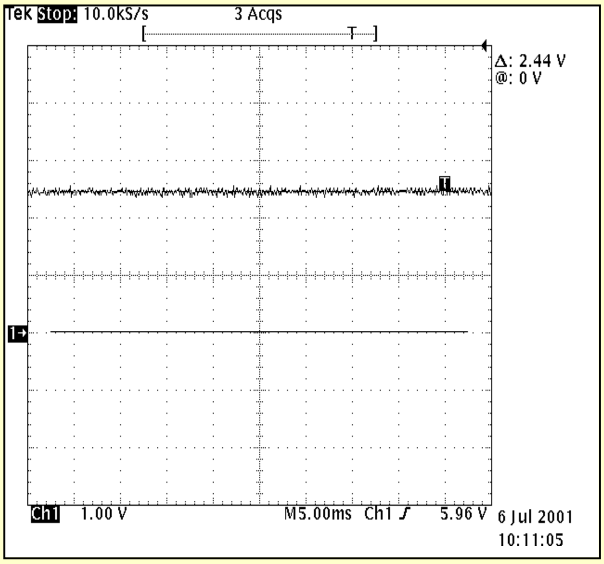
WF19).ICH01 PIN 29



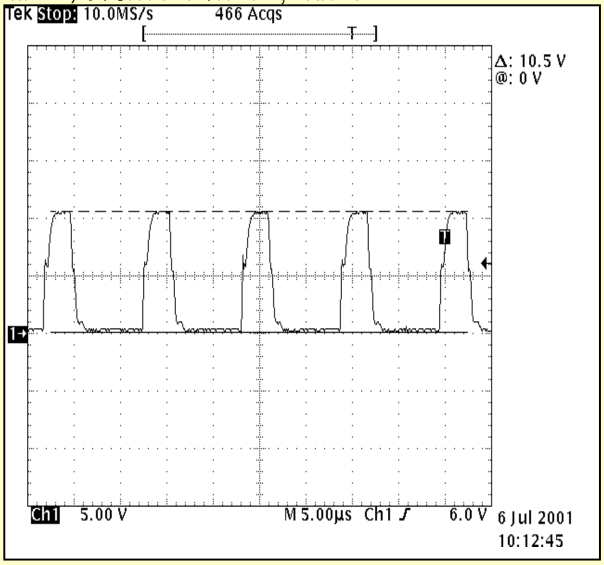
WF20).ICH01 PIN 1 , RH10



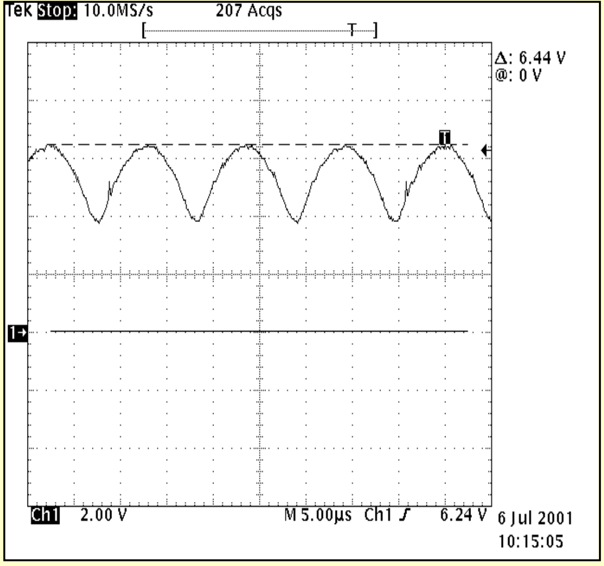
WF21).QH02 Collector



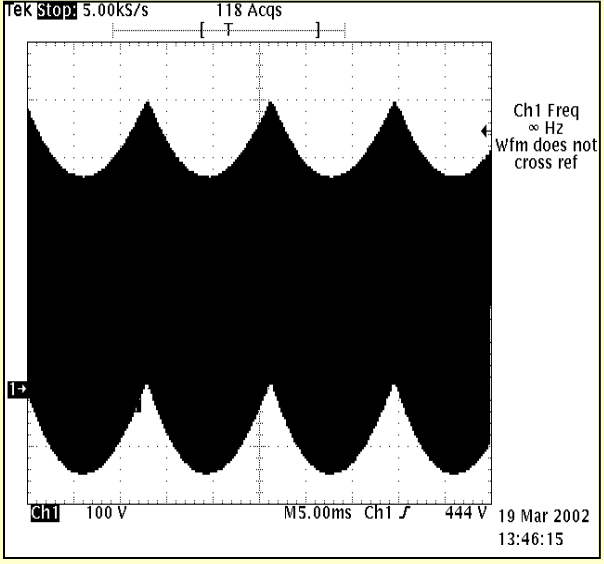
WF22).ICH03 PIN 6 , RH28



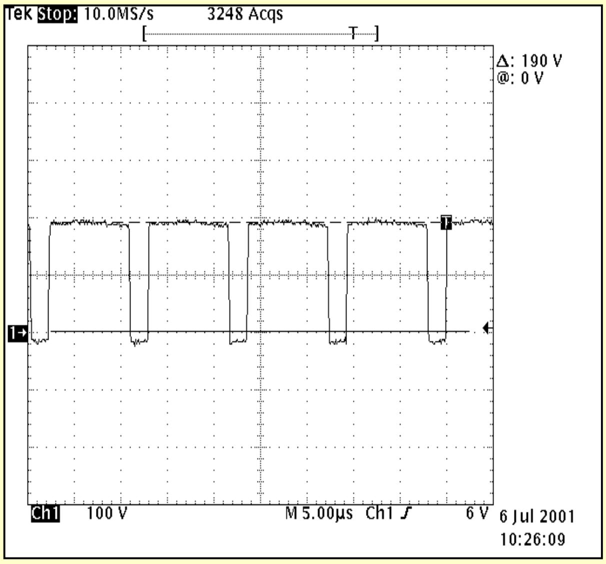
WF23).ICH01 PIN 32



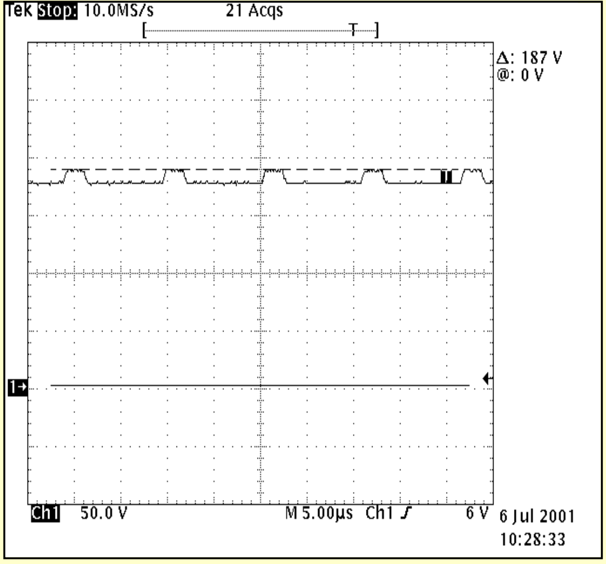
WF24).FBT Pin 13



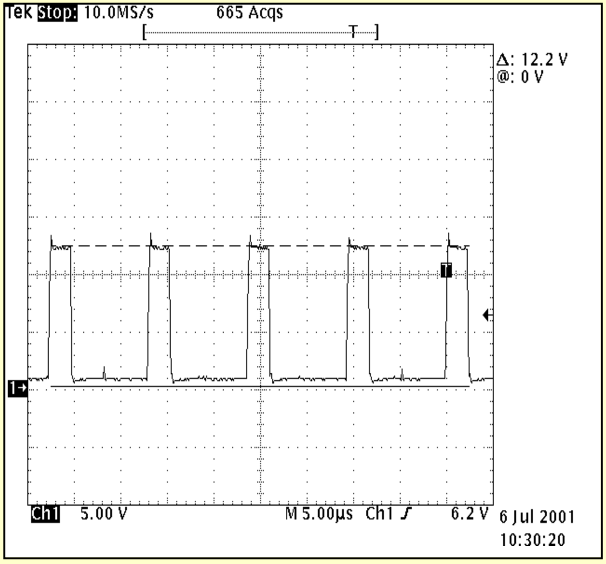
WF25).TH03 PIN 10



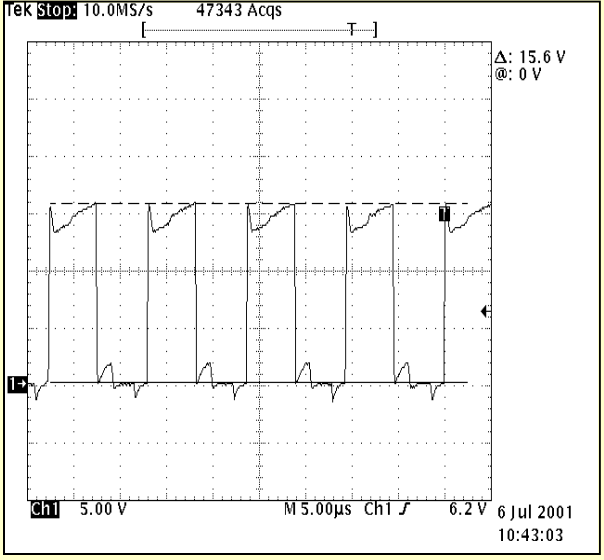
WF26).QH07 Gate



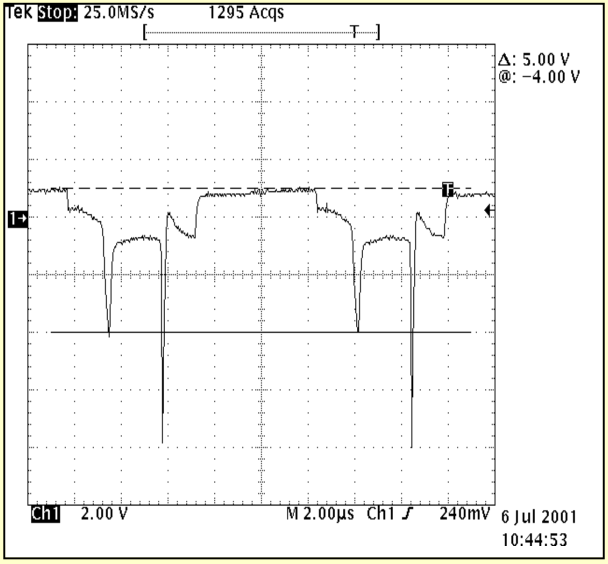
WF27).QH25 Emitter



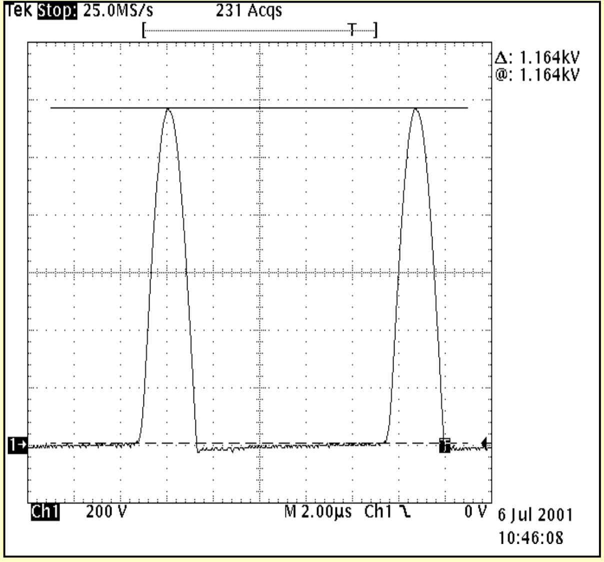
WF28).QH08 Drain



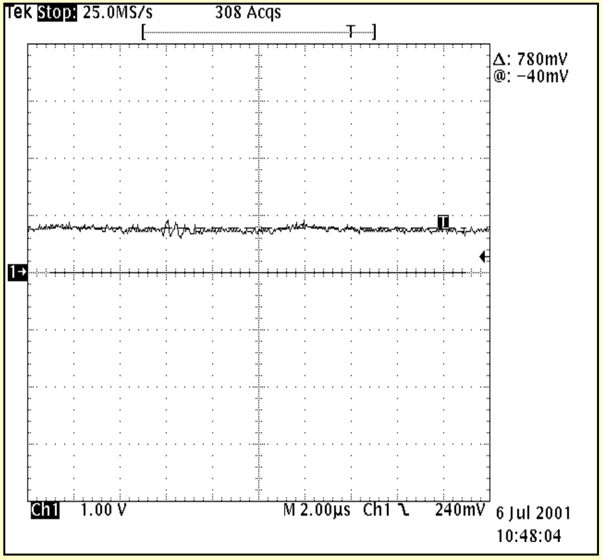
WF29).QH09 Base



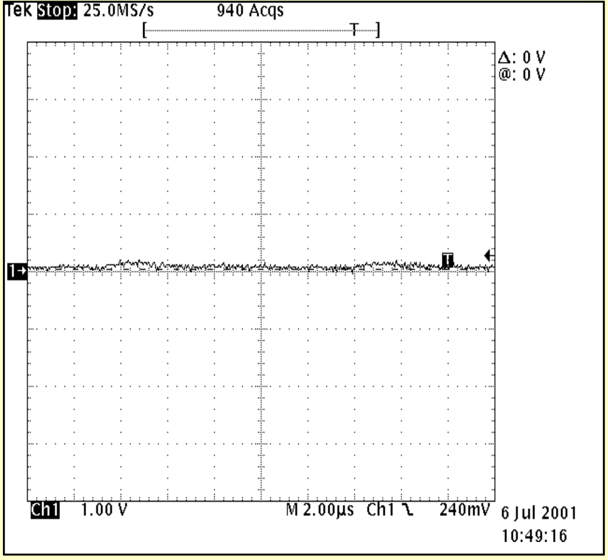
WF30).QH09 Collector



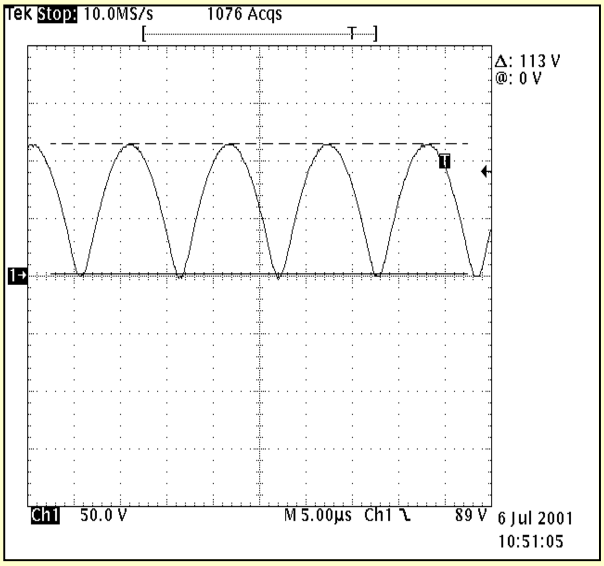
WF31).QH16 Base



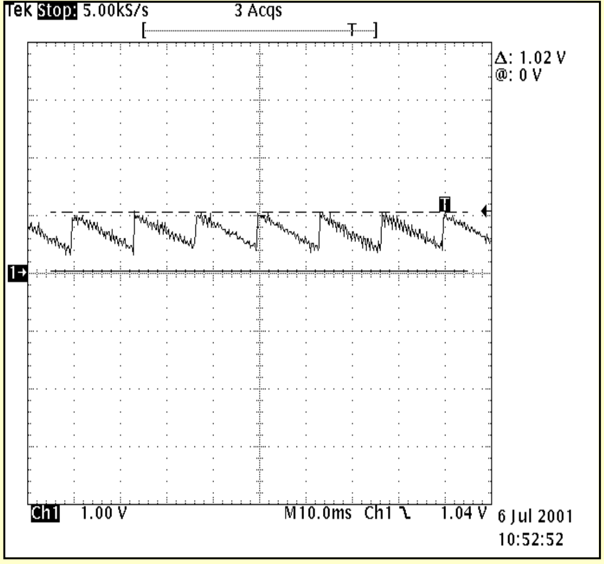
WF32).QH16 Collector



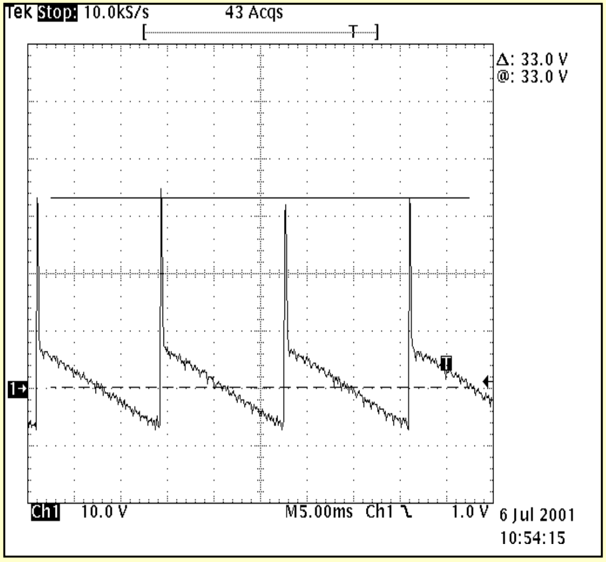
WF33).QH11 Drain



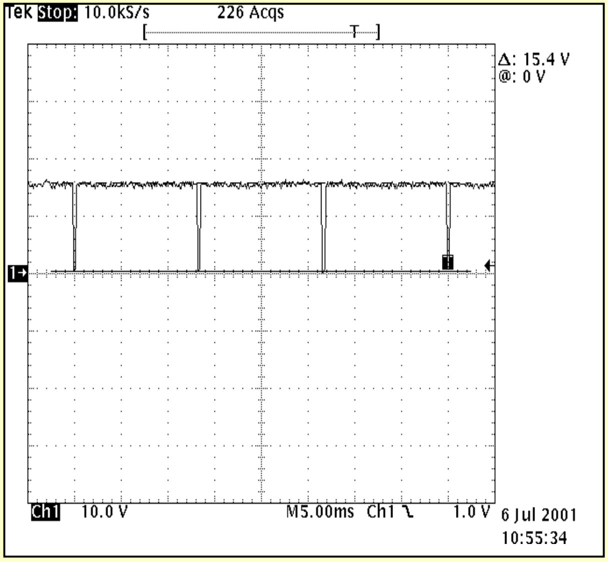
WF34).ICV01 PIN 1



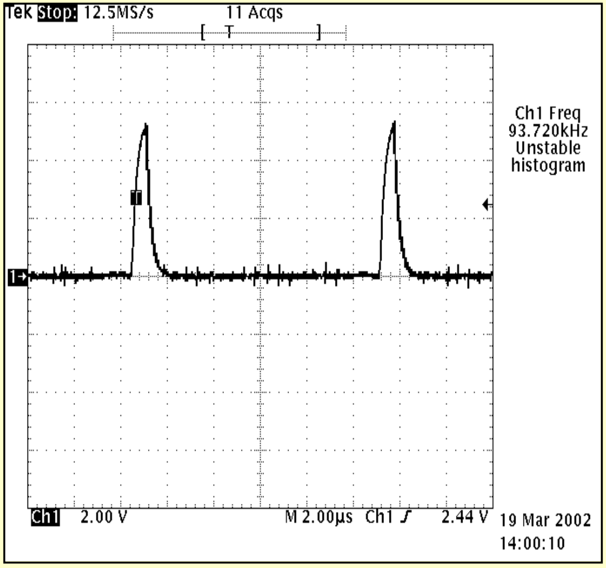
WF35).ICV01 PIN 6



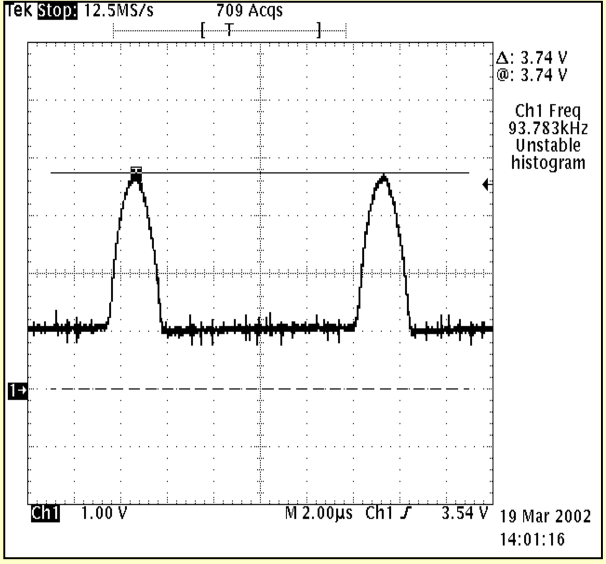
WF36).QH01 Collector



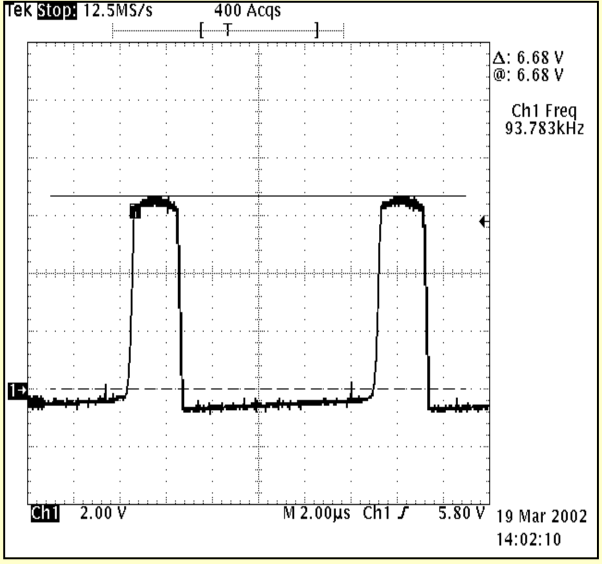
WF37).ICC04 PIN 23



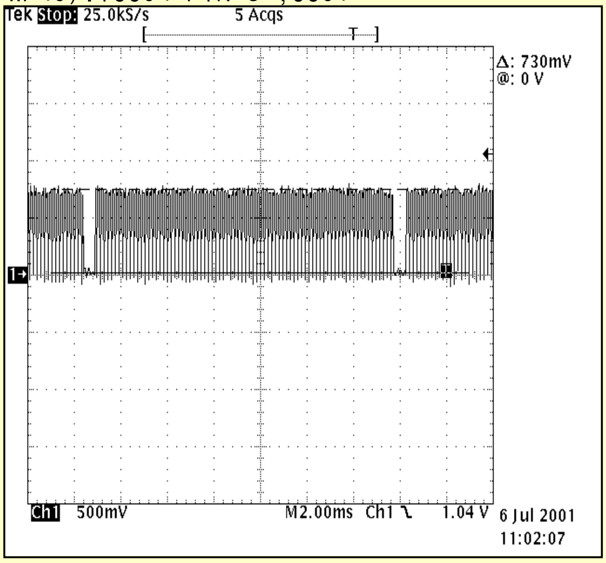
WF38).ICC04 PIN 24



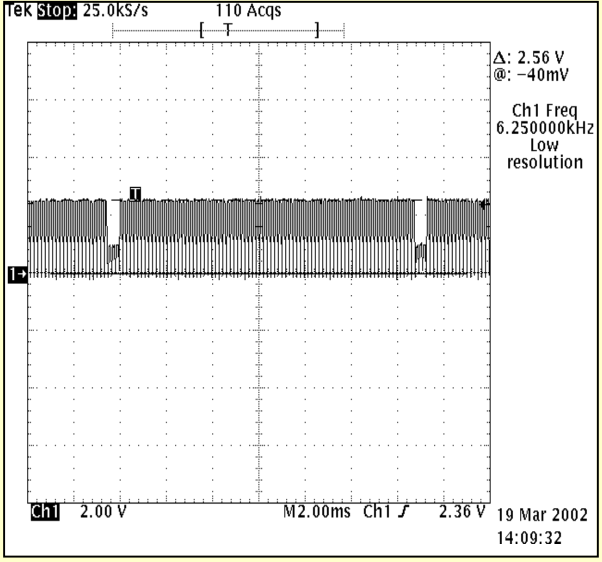
WF39).ICC01 PIN 5



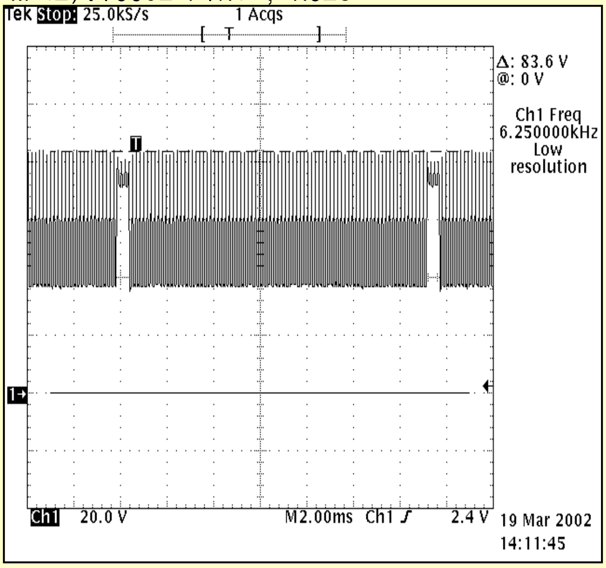
WF40).ICC04 PIN 5 ,CC01



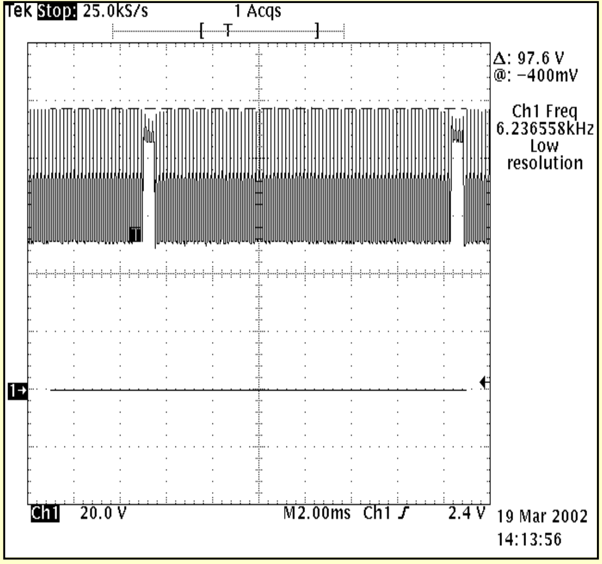
WF41).ICC04 PIN 20



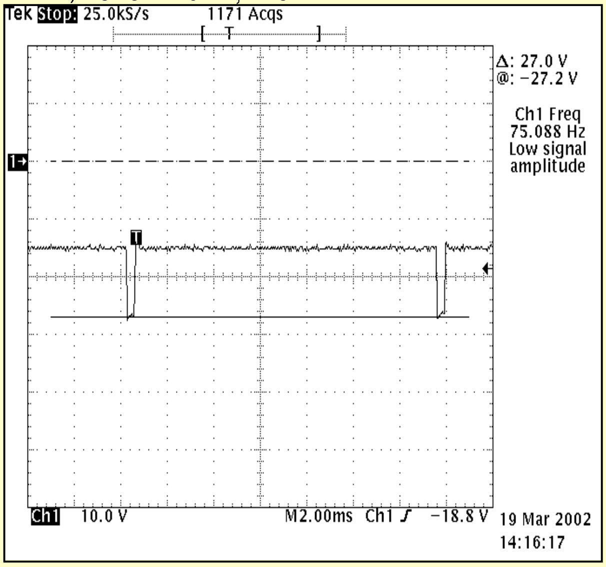
WF42).ICC02 PIN1 , RC26

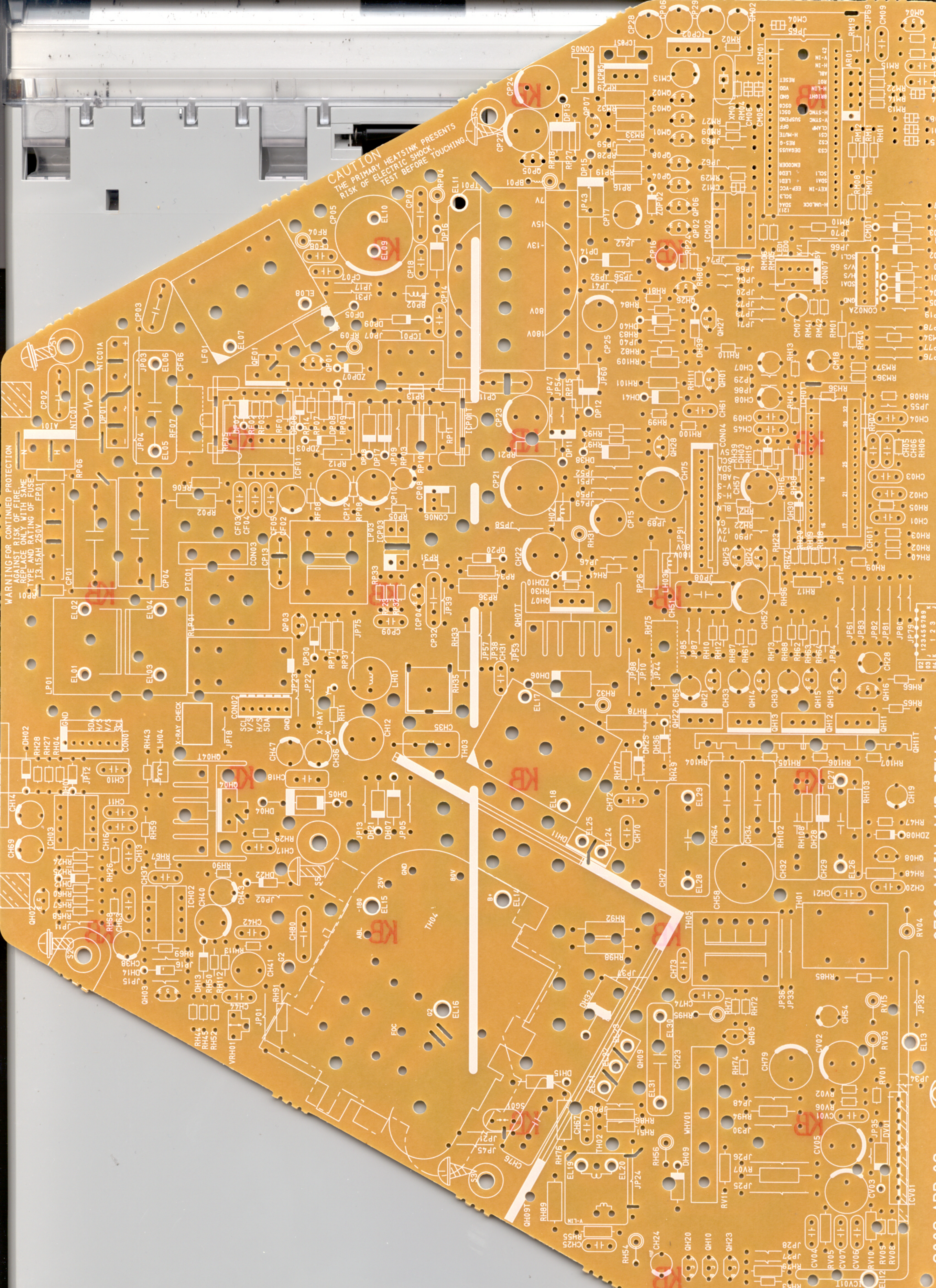


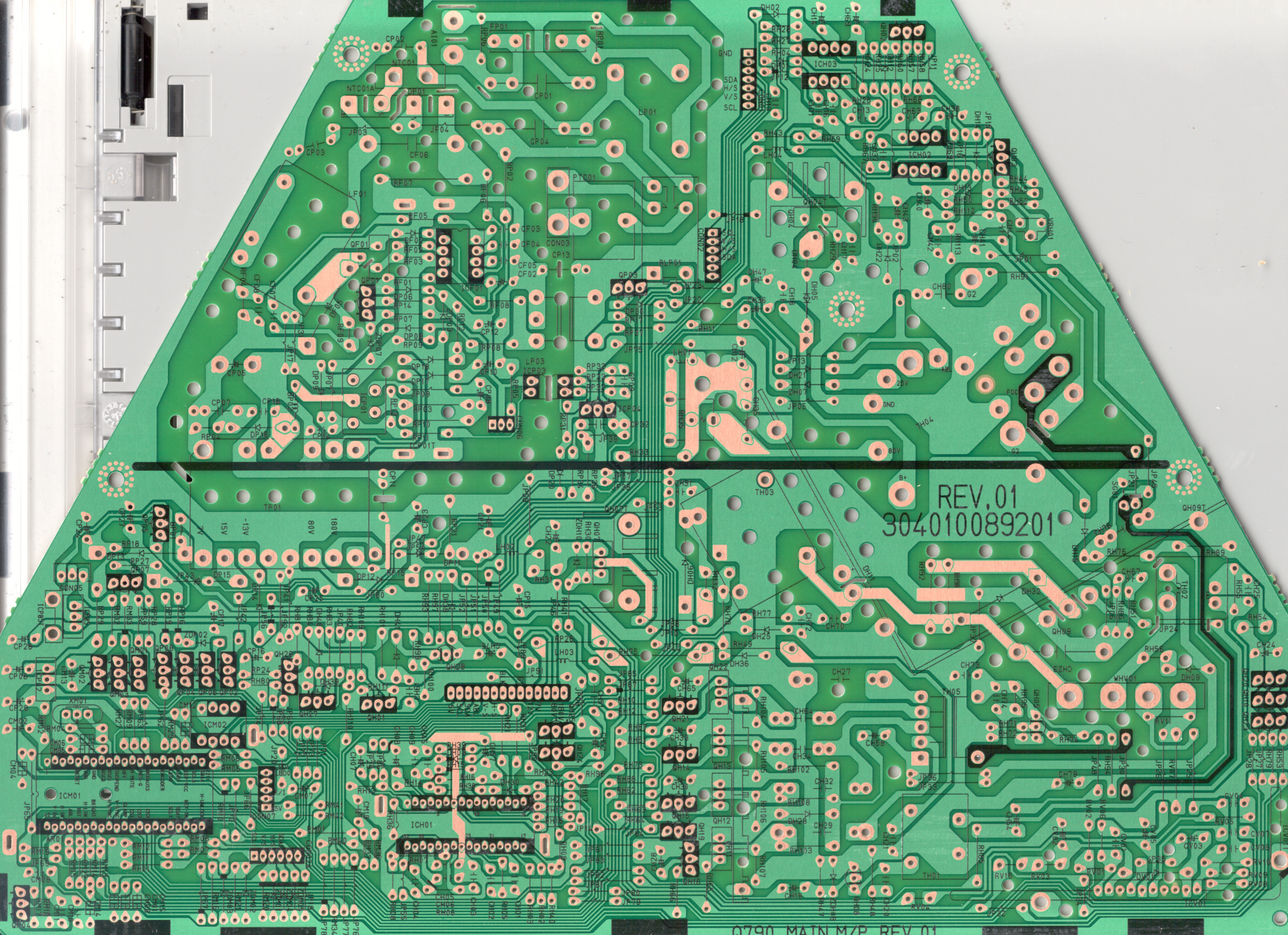
WF43).CNC05 R Cothde

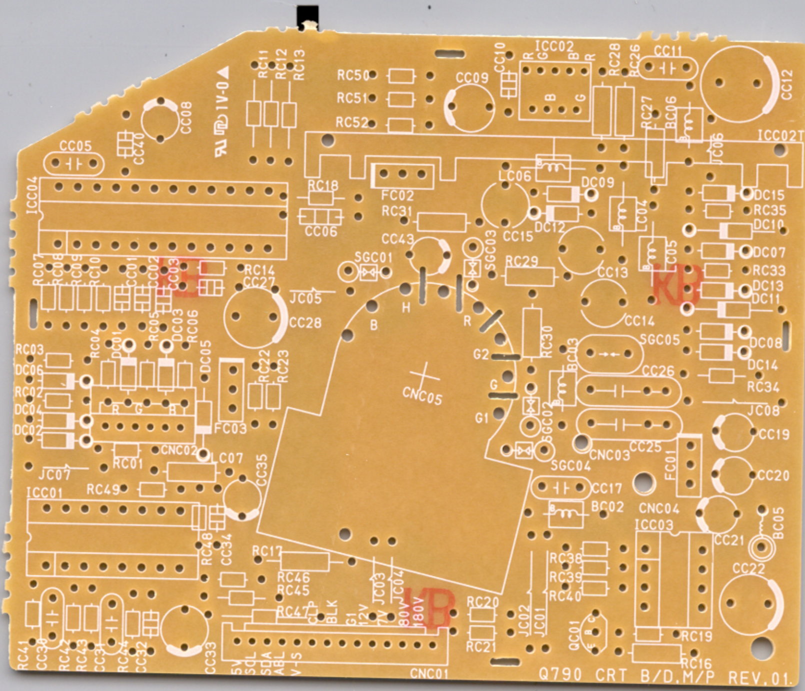


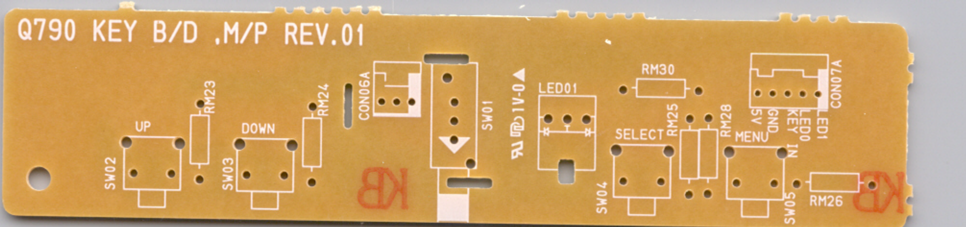
WF44).CNC05 G1 , BC02

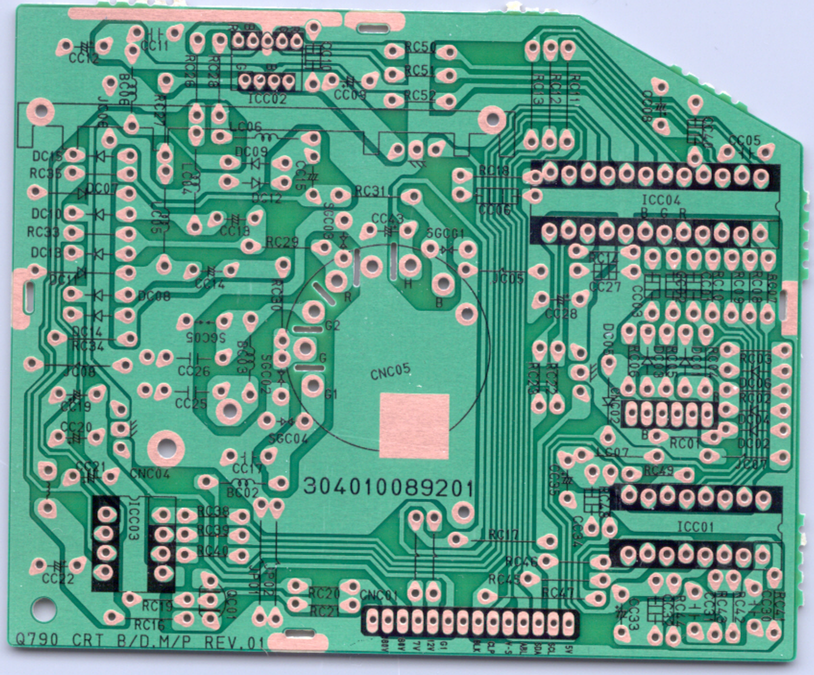


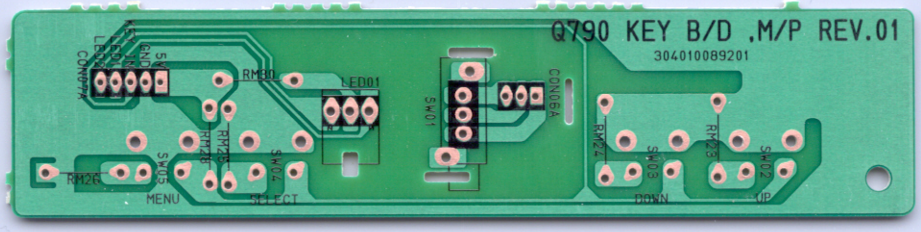

CAUTION
THE PRIMARY HEATSINK PRESENTS
RISK OF ELECTRIC SHOCK.
TEST BEFORE TOUCHING.
WARNING FOR CONTINUED PROTECTION
AGAINST RISK OF FIRE.
REPLACE ONLY WITH SAME
TYPE AND RATING OF FUSE
T3.15AH 250V
FP01
X-RAY CHECK
KB

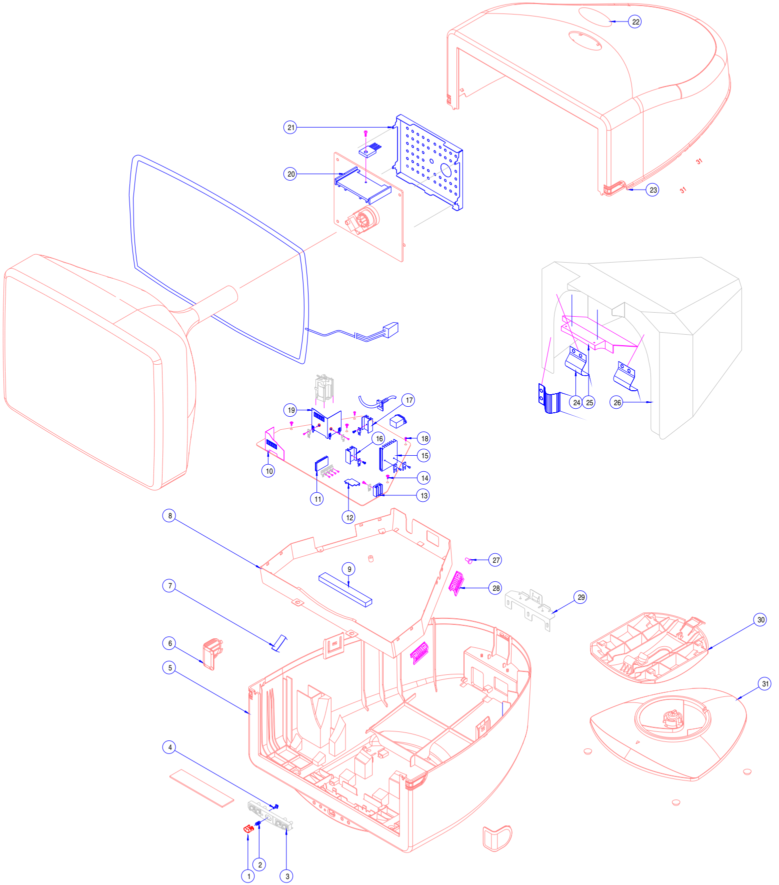

REV.01
304010089201
0790 MAIN M/P REV.01


Q790 CRT B/D.M/P REV.01
ICC01
ICC02
ICC03
ICC04
ICC02T
CNC01
CNC02
CNC03
CNC04
CNC05
FC01
FC02
FC03
LC06
LC07
SGC01
SGC02
SGC03
SGC04
SGC05
QC01
5V
SCL
SDA
ABL
V-S
BLK
G1
12V
7V
80V
180V
H
B
R
G
G1
G2
1V-0
KB


Q790 KEY B/D .M/P REV.01
UP
DOWN
SELECT
MENU
SW01
SW02
SW03
SW04
SW05
LED01
CON06A
CON07A
RM23
RM24
RM25
RM26
RM28
RM30
5V
GND
KEY IN
LED0
LED1
1V-0
KB


Q790 CRT B/D.M/P REV.01
304010089201
CNC05
CNC04
CNC01
ICC01
ICC02
ICC03
ICC04
B G R
G2
G
G1
H
B
R


Q790 KEY B/D .M/P REV.01
304010089201
CON07A
LED01
CON06A
SW01
SW02
SW03
SW04
SW05
RM23
RM24
RM25
RM26
RM28
RM30
MENU
SELECT
DOWN
UP



NO.	PART NO.	PART NAME	DESCRIPION	QT'Y	
31	6201300900	SWIVEL BASE	ABS 94HB	1	
30	6201300800	SWIVEL UPPER	ABS 94HB	1	
29	6120050300	SHIELD PLATE	SPTE T=0.3	1	
28	6120042800	GROUND SPRING,V770	SUS 304	4	
27	M17744006012	SCREW BIN(+) 4x6 MSZPC	MSZPC	1	
26	6120050200	SHLD-CASE COVER ASSY	AI050P T=0.3	1	
25	6225033000	INSULATION ANODE	ABS+PC	1	
24	6120051600	GROUND SPRING	C5210H T=0.1	3	
23	6201307200	TOP COVER	ABS 94HB	1	
22	6201296200	CAP GATE	ABS 94HB	1	
21	6120052900	SHLD-PL, FENCE CRT ASSY	SPTE T=0.3	1	
20	6124036603	HEAT SINK V	AI050P	1	
19	6120051000	F/SHIELD FBT ASSY	AI050P	1	
18	5004000204	SCR-TT.WAL 3*8	MSZPC	2	
17	B4212501011A	H/S POWER 60MM	AI050P	1	
16	B4212501005A	H/S POWER 40MM	AI050P	1	
15	6124029212	H/S FET A	AI050P	1	
14	6129027600	SPECIAL, T.T/W(+) 3*8	MSZPC	3	
13	6124031302	H/S TR C		1	
12	6120048600	MCU COVER	SPTE T=0.3	1	
11	6124032501	H/S CRT		1	
10	6124036700	H/S VERTICAL ASSY		1	
9	6128010135	GASKET EMI		1	
8	6101218100	CHASSIS MAIN,Q770	SECC T=0.8	1	
7	6262005100	RUBBER PLATE	SJ-5816 POLYURETHANE	4	
6	6201307400	COVER CAP	ABS+PC	2	
5	6201307300	BOTTOM COVER	ABS 94HB	1	
4	6220084900	LENS LED POWER	LUCKY PMMA IF 850	1	
3	6215237100	KNOB V/R	ABS 94HB	1	
2	6155037600	SPRING COM.	SUS 304	1	
1	6215237000	KNOB POWER	ABS 94HB	1	

DRAWN BY	PLANNED BY	CHECKED BY	APPROVED BY
S.K.KWAK			J.S.KIM
2002.07.03			2002.07.03

IMAGEQUEST

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN mm (INCHES)
TOLERANCES ARE:
LINEAR ± ANGLES ±
RADII UNLESS NOTED: ±

MDL Q790
REF NO.

ANGLE 3rd
SCALE N/S
SIZE A1

TITLE EXPLODED VIEW
REV A
DWG NO. B4210012701A
SHEET 1/1
FILE NAME :